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HANDBOOK

FLIGHT OPERATING INSTRUCTIONS

USAF MODELS

P-51D AND P-51K SERIES

AIRCRAFT

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52	7 May 1947
52A	7 May 1947
52B	7 May 1947
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TABLE OF CONTENTS

SECTION I ***Description***

PAGE

1. General 1
2. Block Numbering System 1
3. Flight Controls 1
4. Landing Gear 1
5. Brakes 5
6. Hydraulic System 6
7. Power Plant 6
8. Fuel System 7
9. Oil System 7
10. Cooling Systems 7
11. Electrical System 7
12. Miscellaneous Equipment 7

SECTION II ***Pilot's Operating Instructions***

1. Before Entering Cockpit 9
2. On Entering Cockpit 10
3. Fuel System Management 12
4. Starting Engine 13
5. Warm-up and Ground Test 14
6. Scramble Take-off 15
7. Taxiing Instructions 15
8. Before Take-off 15
9. Take-off 16
10. Engine Failure During Take-off 17
11. Climb 18
12. During Flight 18
13. Engine Failure During Flight 20
14. Flying Characteristics 20
15. Stalls 20
16. Spins 21
17. Permissible Acrobatics 22
18. Diving 22
19. Gliding 23
20. Night Flying 23

PAGE

21. Approach and Landing 23
22. Stopping Engine 26
23. Before Leaving Cockpit 26

Section III ***Flight Operating Data***

1. Airspeed Correction Tables 27

SECTION IV ***Emergency Operating Instructions***

1. General 31
2. Engine Failure During Take-off 31
3. Engine Failure During Flight 31
4. Runaway Propeller 31
5. Emergency Exit During Flight 32
6. Ditching 32
7. Landing Gear Emergency Lowering 32
8. Coolant Radiator Flap Emergency Control 34
9. Emergency Release of Bombs or Droppable Fuel Tanks 34
10. Emergency Use of Oxygen 34
11. Use of Miscellaneous Emergency Equipment 34

SECTION V ***Operational Equipment***

1. Gunnery Equipment 35
2. Zero Rail Rockets 36
3. Bombing Equipment 37
4. Communication Equipment 38
5. Oxygen System 44
6. Heating, Ventilating, and Defrosting System 46

SECTION VI ***Extreme Weather Operation***

1. Winter Operation 47
2. Desert Operation 50

APPENDIX I ***Flight Operating Charts***

1. Armor Protection 51
2. Flight Planning 51

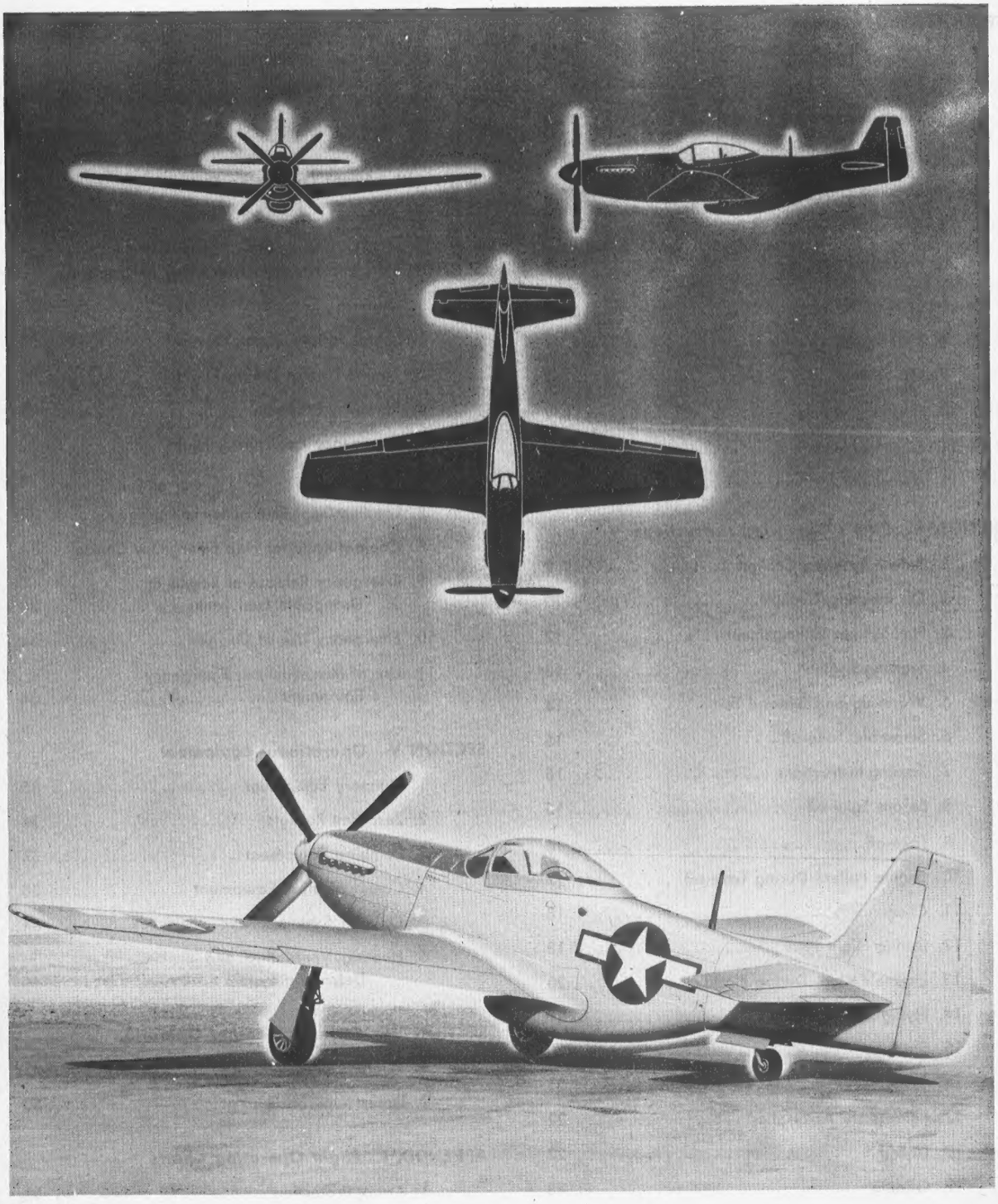
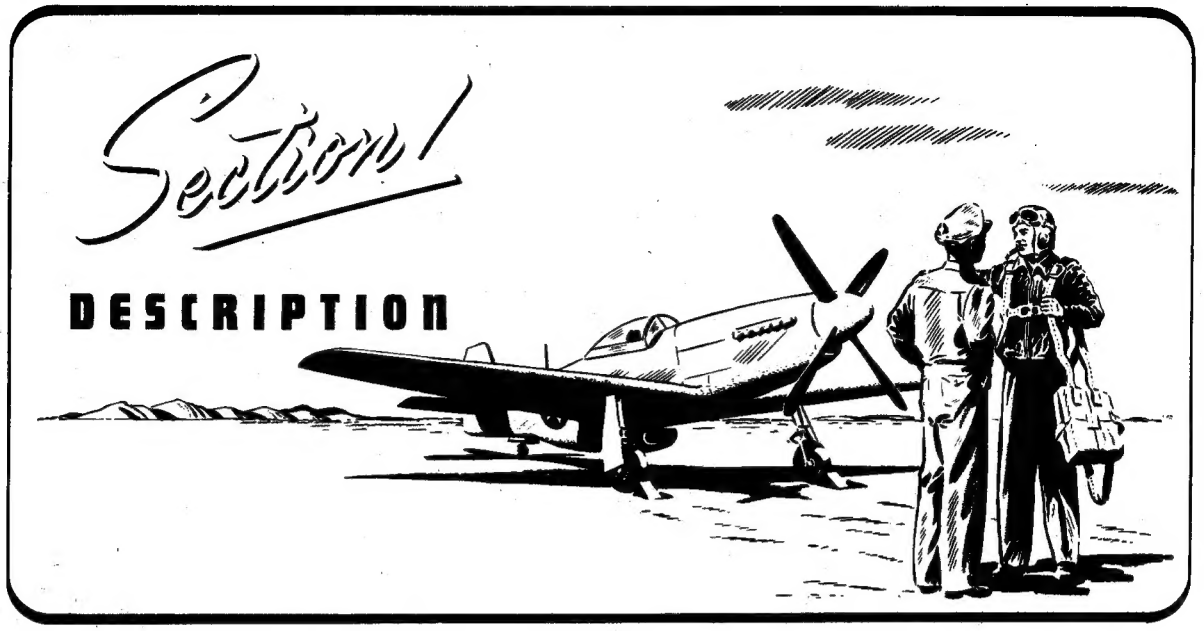


Figure 1—Three-quarter Rear View of Airplane



1. GENERAL.

The North American P-51D and P-51K Fighter Airplanes are single-place, low-wing monoplanes having a wing span of 37 feet, a length of 32 feet 2 inches, and a height (tail down) of 13 feet 8 inches. The gross weight with no external load, full fuel, and armament is approximately 10,000 pounds. The power plant is either a V-1650-7 or V-1650-3 engine. The airplanes are armed with six .50-caliber machine guns and may be equipped with bomb racks to carry bombs, depth charges, chemical tanks, or fuel tanks. Late airplanes are equipped to carry zero rail rockets. Armor plate protection is shown in figure 50.

The only difference between the airplanes designated as P-51K and those designated as P-51D is that the P-51D Airplanes are equipped with Hamilton Standard four-blade propellers; the P-51K Airplanes are equipped with Aeroproducts four-blade propellers. There is no difference in the operation of the two airplane models.

2. BLOCK NUMBERING SYSTEM.

To clarify the relationship between the various groups of serial numbers used on these P-51 Airplanes, the following block numbering system has been adopted.

BLOCK NUMBER	SERIAL NUMBER INCLUDED
P-51D-5-NA	AAF44-13253 to 14052
P-51D-10-NA	AAF44-14053 to 14852
P-51D-5-NA	AAF44-14853 to 15752
P-51D-20-NA	AAF44-63160 to 64159
	AAF44-72027 to 72626
P-51D-25-NA	AAF44-72627 to 74226
P-51D-30-NA	AAF44-74227 to 75026
P-51D-5-NT	AAF44-11153 to 11352
P-51K-1-NT	AAF44-11353 to 11552
P-51K-5-NT	AAF44-11553 to 11952
P-51K-10-NT	AAF44-11953 to 12552
P-51K-15-NT	AAF44-12553 to 12852
P-51D-20-NT	AAF44-12853 to 13252
P-51D-25-NT	AAF44-84390 to 84989
	AAF45-11343 to 11542
P-51D-30-NT	AAF45-11543 to 12342

3. FLIGHT CONTROLS.

The ailerons, elevators, and rudder are conventionally operated by a control stick and rudder pedals. Trim tab controls (a wheel for the elevator tabs, and knobs for the rudder and aileron tabs) and the flap control lever are on the control pedestal at the left side of the cockpit. A surface control lock is forward of the base of the control stick. A dorsal fin and reverse boost rudder tab have been installed on most airplanes. On late airplanes and on some airplanes modified in service, a 20-pound bobweight has been added to the elevator control system to improve the flight characteristics. *(See section II, paragraph* 14. *b.)*

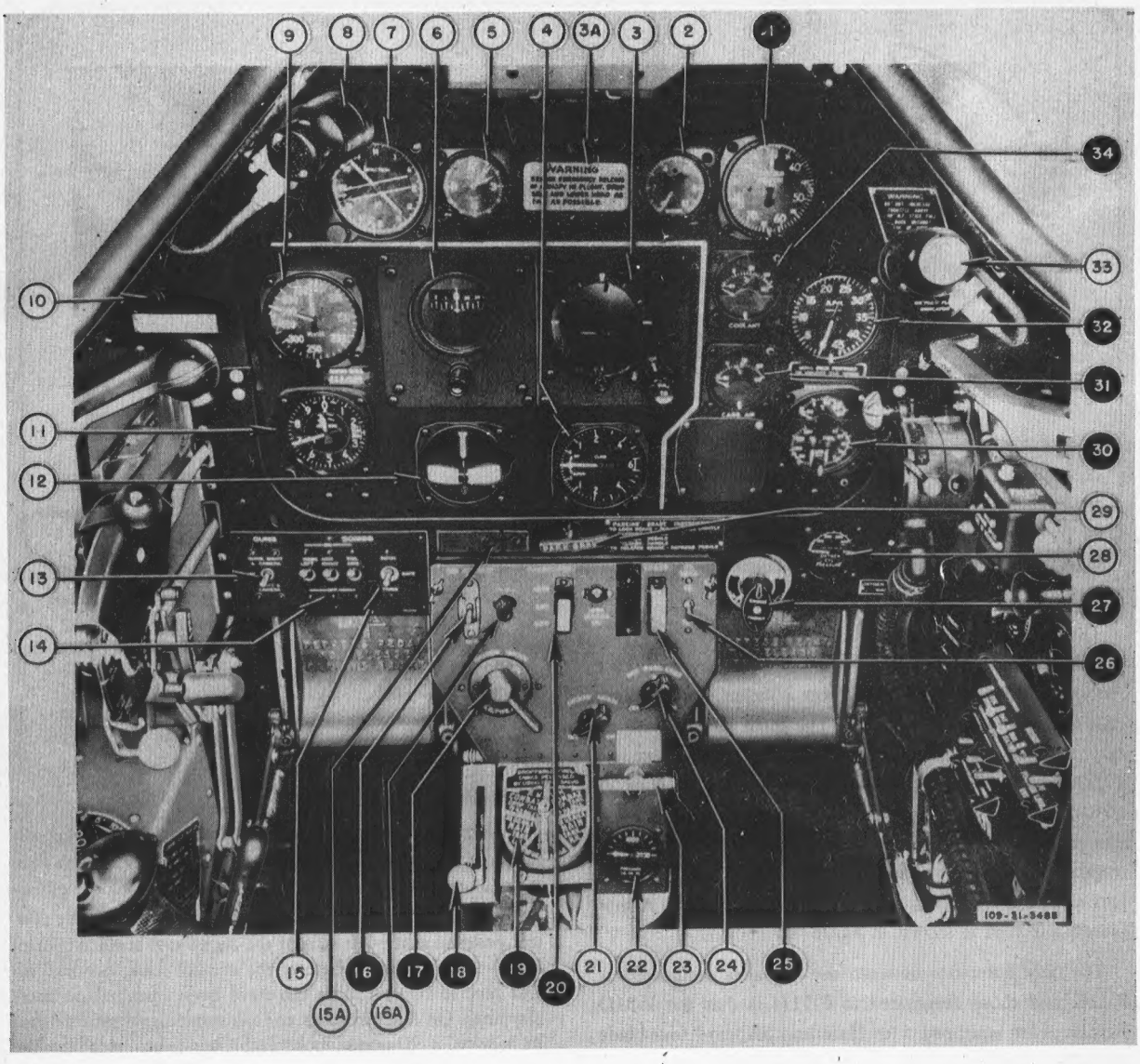
4. LANDING GEAR.

a. GENERAL.—The landing gear is hydraulically operated. When the surface control stick is pulled back, the tail wheel is linked to the rudder pedals and is steerable 6 degrees right or left. With the control stick forward, the tail wheel is unlocked and full-swiveling.

CAUTION

Do not move the landing gear control when airplane is on the ground, as there is no safety mechanism to keep the gear from retracting.

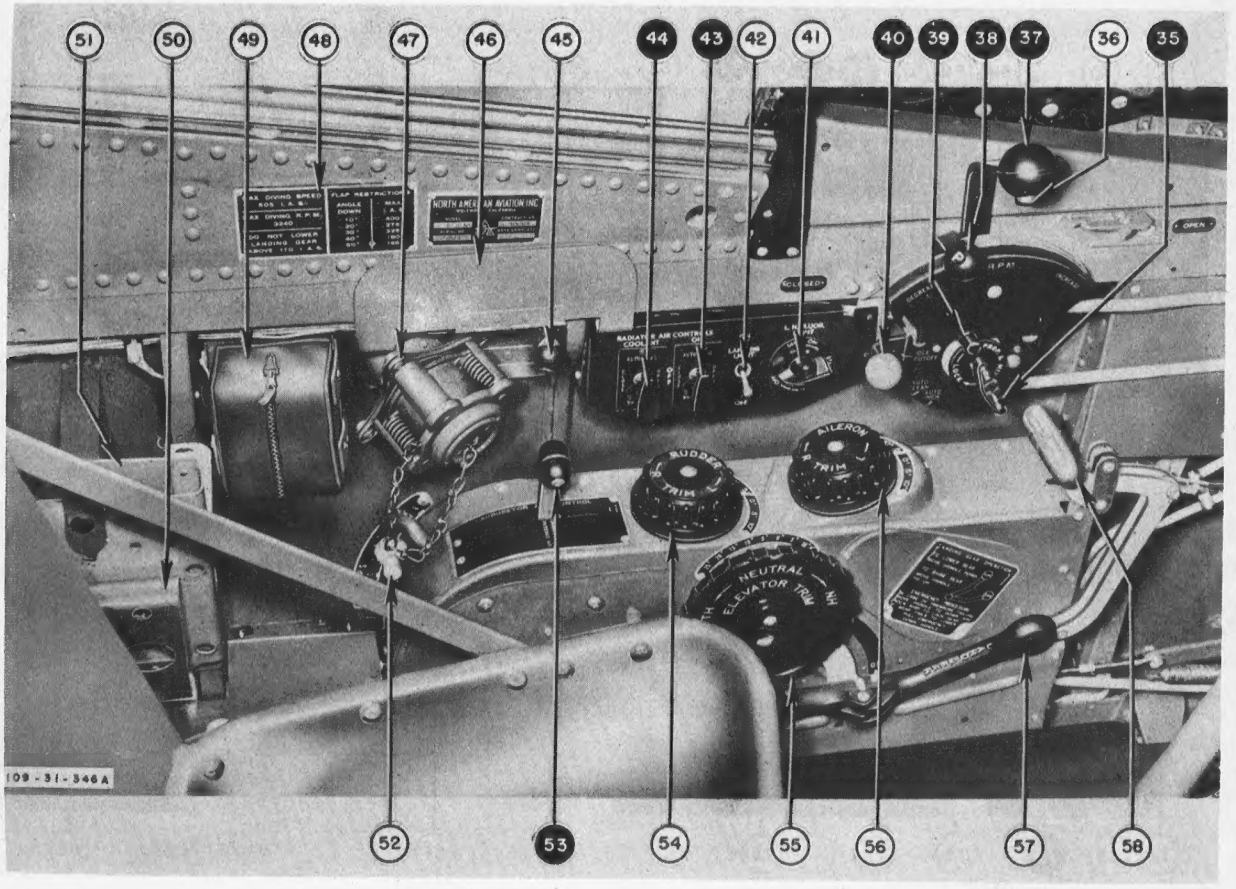
b. LANDING GEAR WARNING SIGNALS (Late Airplanes).—On late airplanes, the landing gear warning signal system consists of a red and a green warning light at the



1. Manifold Pressure Gage
2. Suction Gage
3. Flight Indicator
3A. Canopy Emergency Release Placard
4. Rate-of-Climb Indicator
5. Clock
6. Directional Gyro
7. Remote-reading Compass Indicator
8. Fluorescent Light
9. Airspeed Indicator
10. Landing Gear Warning Signal Test Switch
11. Altimeter
12. Bank-and-Turn Indicator
13. Gun and Camera Safety Switch
14. Bomb Arming Switches
15. Bomb Release Selector Switch
15A. Landing Gear Position Indicator Lights
16. Fuel Booster Pump Switch
16A. Warning Horn Silencer Button
17. Ignition Switch
18. Fuel Shut-off Control
19. Fuel Selector Control
20. Supercharger Control Switch
21. Cockpit Light Switch
22. Hydraulic Pressure Gage
23. Fairing Door Emergency Control
24. Gun Sight Rheostat
25. Starter Switch
26. Oil Dilution Switch
27. Engine Primer
28. Oxygen Pressure Gage
29. Parking Brake Handle
30. Oil Temperature and Fuel and Oil Pressure Gage
31. Carburetor Air Temperature Indicator
32. Tachometer
33. Fluorescent Light
34. Coolant Temperature Gage

Indicates power plant and fuel system controls and instruments.

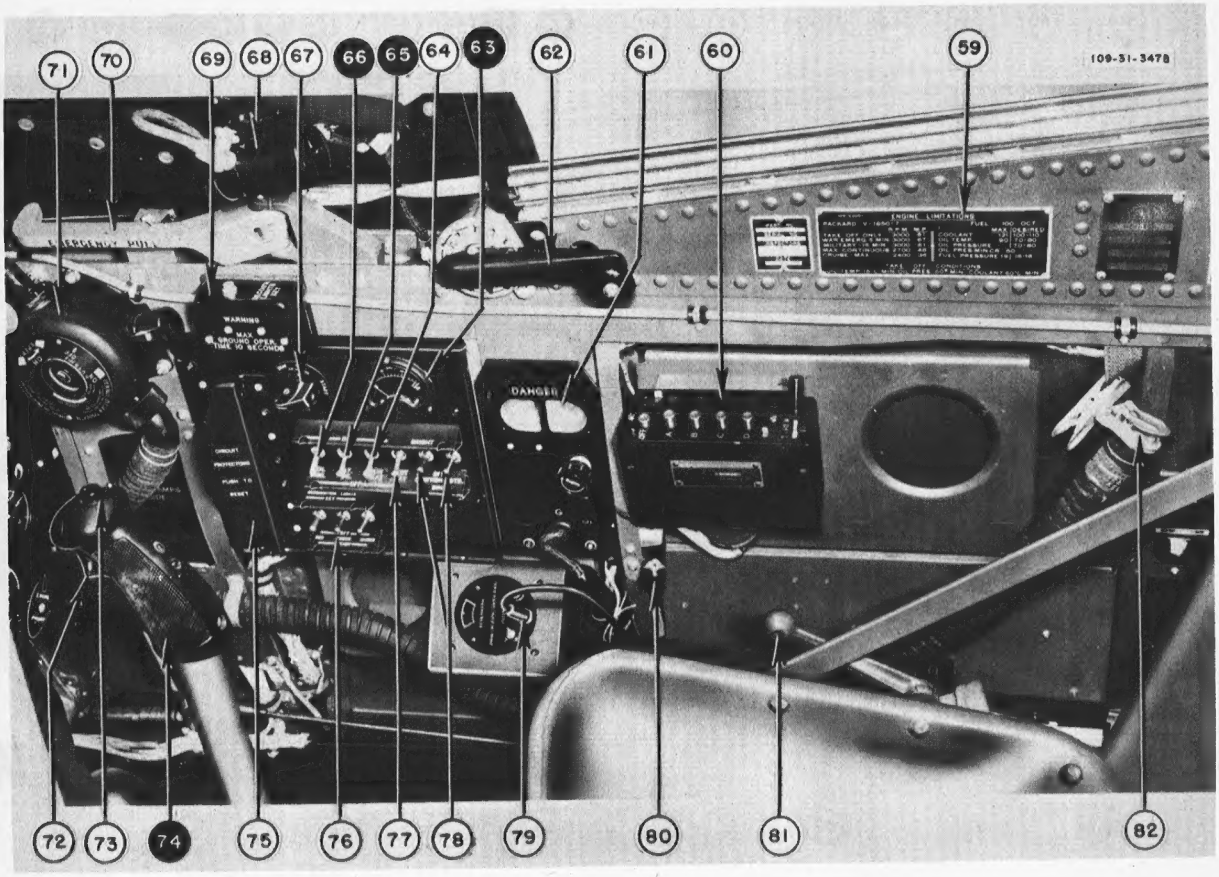
Figure 2—Cockpit—Forward View (Typical of All Models)



35. Throttle Friction Lock
36. Radio Transmit-Receive Switch
37. Throttle Control
38. Propeller Control
39. Propeller and Mixture Control Friction Lock
40. Mixture Control
41. Left-hand Fluorescent Light Switch
42. Landing Light Switch
43. Oil Radiator Air Control Switch
44. Coolant Radiator Air Control Switch
45. Cockpit Light
46. Arm Rest
47. Signal Pistol Mount
48. Airplane Restriction Plate
49. Signal Pistol Stowage Case
50. Drop Message Bag Holder
51. Map Case
52. Wing Flap Control
53. Carburetor Air Control
54. Rudder Trim Tab Control
55. Elevator Trim Tab Control
56. Aileron Trim Tab Control
57. Landing Gear Control
58. Bomb Salvo Control Handles

⊗ Indicates power plant and fuel system controls and instruments.

Figure 3—Cockpit—Left Side (Typical of All Models)



59. Engine Limitations Plate
60. SCR-522-A Radio Control Box
61. Detonator Switches
62. Canopy Handcrank
63. Ammeter
64. Gun Heater Switch
65. Battery-disconnect Switch
66. Generator-disconnect Switch
67. Right-hand Fluorescent Light Switch
68. Fluorescent Light
69. Recognition Light Keying Switch
70. Canopy Emergency Release Handle
71. Oxygen Regulator
72. Gun Trigger Switch
73. Bomb Release Switch
74. Surface Control Stick
75. Circuit-breaker Reset Guard
76. Recognition Light Switches
77. Pitot Heater Switch
78. Position Light Switches
79. Detrola Receiver
80. Cockpit Light
81. Seat Adjustment Handle
82. Oxygen Mask Connection

⊗ Indicates power plant and fuel system controls and instruments.

Figure 4—Cockpit—Right Side (Typical of All Models)

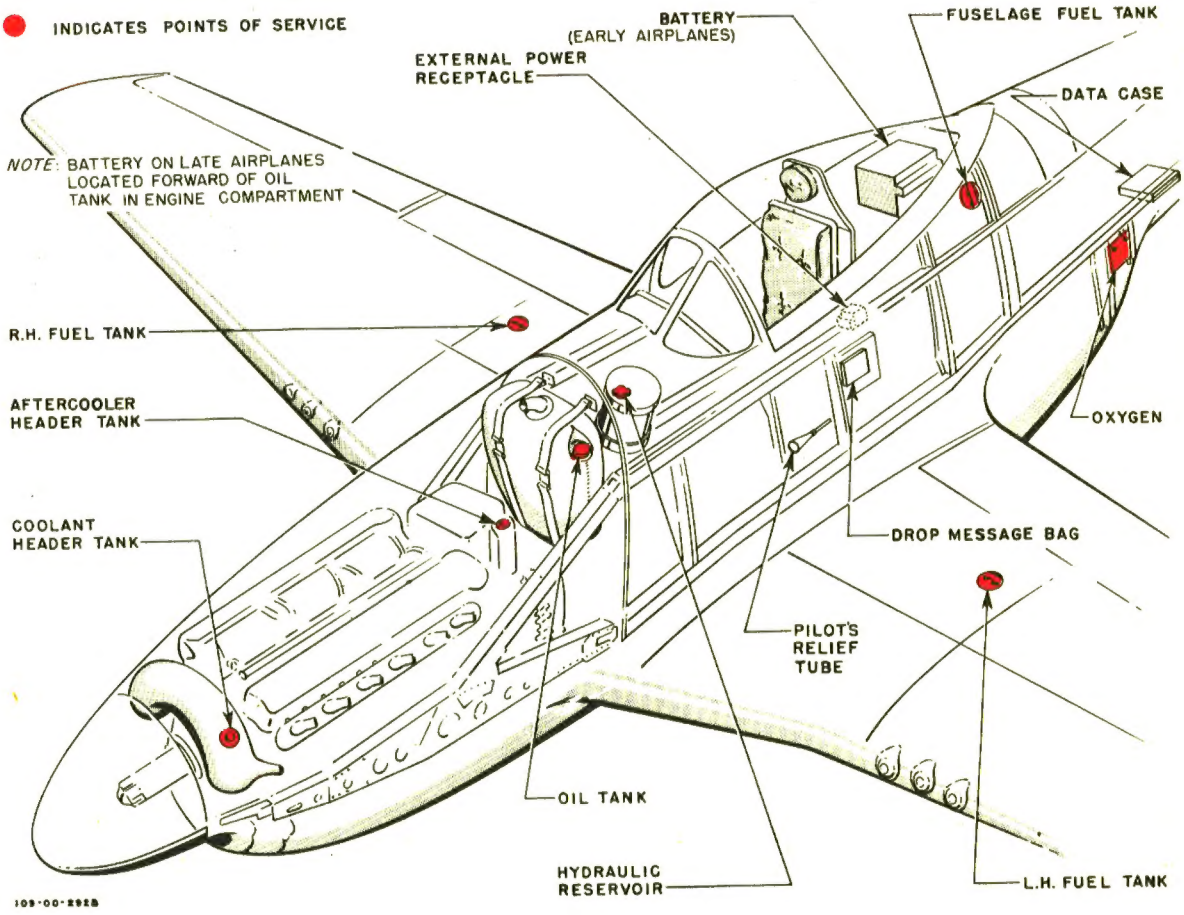


Figure 5—Interior Arrangement

left of the instrument panel, and a warning horn located on the left side of the cockpit, aft of the pilot's seat. *(See figure 25.)* Both warning lights have dimmer masks and are of the push-to-test type. The signals operate in the following manner:

(3) *Green light off, red light off* when gear is up and down and locked, regardless of throttle or fairing door position.

(2) *Green light off, red light on* when gear is in any unlocked position, regardless of throttle position; or when the gear is up and locked and the fairing doors are not fully closed.

(3) *Green light off, red light off* when gear is up and locked with fairing doors fully closed and throttle forward (beyond minimum cruising power).

(4) On early airplanes, *green light off, red light on, and horn on* when gear is up and locked and throttle is retarded below minimum cruising power.

(5) On late airplanes, *green light off, red light on, and horn on* when gear is in any position other than down and locked and throttle is retarded below minimum cruising power.

Note

A horn cutout switch is on the front switch panel. When the throttle is advanced after the horn has been cut out, the horn circuit is automatically reset. While the throttle is retarded and the horn is cut out, the red light remains on until the gear reaches the down-and-locked position.

c. LANDING GEAR WARNING LIGHT (Early Airplanes).—Some early airplanes do not have the green light or warning horn. The red light operates the same on all airplanes (when main gear is in transit between up-and-locked and down-and-locked positions or when gear is up and throttle is retarded for landing), but it is tested with a switch in early installations.

5. BRAKES.

The brakes are hydraulically operated. Fluid for the brake system is obtained from the hydraulic reservoir. A standpipe in the reservoir reserves a supply of fluid for brake operation in case fluid for the hydraulic system is lost. The parking

brake control is just below the center of the instrument panel.

6. HYDRAULIC SYSTEM.

The landing gear and wing flaps are operated hydraulically. The wing flaps are preselectively set by moving the control to the desired flap setting. The flaps are automatically held in the position chosen until another flap setting is selected.

7. POWER PLANT.

a. ENGINE.—The Packard-built Rolls Royce V-1650-7 and V-1650-3 are 12-cylinder, liquid-cooled, in-line engines. They are equipped with two-stage, two-speed superchargers, injection-type carburetors, and automatic manifold pressure regulators. An aneroid switch automatically controls the supercharger blower shift on both models. The engines turn either a Hamilton Standard or an Aeroproducts propeller.

b. FUEL, OIL, AND COOLANT.

Fuel—Specification No. AN-F-48, Grade 100/130
Oil—Specification AN-O-8, Grade 1120
Coolant—Type D (70 percent water and 30 percent ethylene glycol, Specification No. AN-E-2, inhibited with NaMBT)

Note

For operation in temperatures below −12°C, use Type C coolant (30 percent water and 70 percent ethylene glycol, Specification No. AN-E-2, inhibited with NaMBT).

c. AUTOMATIC MANIFOLD PRESSURE REGULATOR.—On the V-1650-3 or V-1650-7 engine, the regulator is not sensitive to manifold pressure changes throughout the entire range of available supercharger pressures. When operating at powers between 42 and 61 in. Hg manifold pressure, the regulator should afford constant manifold pressure within plus or minus one inch for any flight attitude below the critical altitude for the flight condition in question. However, when operating below approximately 42 in. Hg manifold pressure, the regulator cannot be expected to hold a constant manifold pressure for the various flight conditions.

d. ENGINE CONTROLS.

(1) THROTTLE.—On late airplanes, a gate on the engine control quadrant limits the manifold pressure to 61 in. Hg, with the throttle full forward. Moving the throttle past the gate enables the pilot to obtain a war emergency power of 67 in. Hg. On early airplanes, which have no gate position, war emergency power is obtained by pulling the emergency boost control, at the left of the instrument panel. Instructions on the use of the War Emergency Rating are given in section II, paragraph 12. *b.*

(2) MIXTURE.—On late P-51D and P-51K Airplanes, the mixture control has the following settings: "IDLE CUT OFF," "RUN," "AUTO RICH" (marked only on some late airplanes), and "EMERGENCY FULL RICH." The carburetor on these airplanes is fully automatic, and the normal operating position is "RUN."

Note

"RUN" position is recommended for take-off; however, "AUTO RICH," supplied on late airplanes as an alternate position for take-off, may be used. Return the control to "RUN" when a safe altitude is reached.

The "EMERGENCY FULL RICH" position is for use in case the carburetor fails to operate properly in "RUN." To place the control in "EMERGENCY FULL RICH," a spring detent on the lever must be pressed with the thumb and the control moved through the lockwire at the "RUN" position (at "AUTO RICH" on late airplanes). On early P-51D and early P-51K Airplanes, the mixture control positions are "IDLE CUT OFF," "AUTO LEAN," and "AUTO RICH" with no lockwire.

(3) AUTOMATIC SUPERCHARGER CONTROL.

(a) The supercharger control switch has three positions: "LOW," "AUTOMATIC," and "HIGH." *(See figures 13 and 14.)* The switch should be in "AUTOMATIC" for all normal operations. When it is in this position, supercharger speed change is controlled by an aneroid-type pressure switch, vented to carburetor intake pressure. The aneroid switch will change the blower speed from low to high at the altitude for best performance at military power. It is calibrated to shift the supercharger to high blower at a carburetor entrance pressure equivalent to approximately 19,600 feet altitude on the V-1650-3 engine (between 20,800 and 24,800 feet airplane altitude) and to approximately 14,500 feet altitude on the V-1650-7 engine (between 15,700 and 19,700 feet airplane altitude). To prevent excessively frequent blower speed changes, resulting from small speed or altitude changes near shift altitude, the aneroid switch is constructed so that the shift downward from high to low speed occurs approximately 1500 feet below the upward shift point during a normal descent. However, during a dive or rapid descent, the shift downward may occur at, or above, the upward shift point because of the increase of ram air pressure in the carburetor air intake caused by the higher airspeed.

Note

It will be noted in flight that the blower shift altitude specified in the preceding paragraph *(a)* for the particular engine does not correspond to the figure read by the pilot on the altimeter. This condition is normal, since the blower shift aneroid is referenced to carburetor entrance air pressure which increases with increase in indicated airspeed. Differences in airplane altitude at the time of blower shift are due to the ram variations in climb, level flight, and descent.

(b) For maximum fuel mileage on long-range cruising operations, it is advantageous to remain in low blower speed above the altitude of shift. The ranges shown on the charts in appendix I are possible only when using proper supercharger speed, exactly as noted.

(c) In case of blower shift aneroid failure, the supercharger will automatically return to low speed and the amber light beside the manual blower switch will go out. This light is on only when the supercharger is in "HIGH." On late airplanes the light is of the push-to-test type.

(4) ENGINE PRIMER.—Early airplanes have a hand-priming system. On late airplanes, the priming system is controlled by an electric switch. *(See figures 13 and 14.)*

e. CARBURETOR AIR.—Ram air, unrammed filtered air, or (on late airplanes) unrammed hot air may be supplied to the carburetor. Early airplanes have only a cold air control; late airplanes have both a cold and hot air control. Figure 49 shows the principle of operation. In order to obtain hot air, the hot air control must be in "HOT" and the cold air control must be in "UNRAMMED FILTERED AIR." If the cold air control is in "RAM AIR," operation of the hot air control will be ineffective. On all airplanes, hot air will automatically be admitted to the carburetor whenever the air duct becomes obstructed by ice. For further information on the carburetor heat system, see section VI, paragraph 1. *a.* (4).

8. FUEL SYSTEM.

Two self-sealing tanks are carried in the wing, and an auxiliary 85-gallon, self-sealing tank is installed in the fuselage, aft of the cockpit. Two 75-gallon, pressurized drop tanks may be installed on the wing racks. Fuel flows as follows: from either of the wing tanks or the fuselage tank through a booster pump to the fuel selector valve; through the selector valve, shut-off valve, and fuel strainer to the engine-driven fuel pump; then to the carburetor. Fuel from the combat tank flows through the selector valve into the main fuel line. All main fuel lines are self-sealing. Late airplanes have the carburetor vapor return line routed to the fuselage tank. On other airplanes the vapor return line is connected to the left wing tank. It is important that you know to which tank the vapor return line is connected. *(See section II, paragraph 3.)* The booster pump switch on early airplanes has three positions: "NORMAL," "EMERGENCY," and "OFF." On late airplanes, the switch has two positions: "ON" and "OFF." *(See figures 13 and 14.)*

CAUTION

As neither the wing nor the bomb racks were designed for the 110-gallon combat tanks, it is not recommended that these tanks be used. If this installation is necessary to accomplish particular missions, the airplane should be held to straight and level flight until the tanks are released.

9. OIL SYSTEM.

The oil system has a capacity of 21 US (17.5 Imperial) gallons. Scavenged oil flows through an oil radiator in the air scoop assembly. A thermostatically controlled outlet flap regulates the flow of air through the radiator. An oil dilution system is provided. *(See figures 13 and 14 for location of control.)*

10. COOLING SYSTEMS.

The engine incorporates two separate cooling systems: one to cool the engine, and the other to cool the supercharger fuel-air mixture. Each system has a separate pump, expansion tank, and radiator. The engine cooling system radiator and aftercooling system radiator are constructed as a unit which is located in the air scoop assembly above and aft of the oil radiator. A thermostatically controlled outlet flap regulates the flow of air through the radiators. The controlling switch for the flap actuator, located on the front switch panel, has four positions: "AUTOMATIC" for normal operation; two emergency manual positions, "OPEN" and "CLOSE," and an "OFF" position. A spring-loaded guard holds the switch in "AUTOMATIC," the position used for all operation except for control failure and during ground check. A manual emergency release, on the right side of the cockpit floor, is provided on late airplanes to open the flap in case of actuator failure.

11. ELECTRICAL SYSTEM.

The 24-volt, direct-current electrical system receives power from an engine-driven generator. A 34-ampere hour battery serves as a stand-by. An external power socket is on the right side of the fuselage just behind the cockpit. External power should be used instead of the airplane battery to start the engine and operate the electrical system while the airplane is on the ground. An adapter for connecting the British type of external power supply is stowed adjacent to the external power socket. All of the electrical circuits are protected by either circuit breakers or circuit-breaker switches located on the right switch panel. On airplanes which have the zero rail rocket installation, the armament control switches are on the front switch panel and most of the engine control switches are on a separate panel at the left. *(See figures 14 and 37.)* Location of main electrical switches is shown in figures 2 and 4. On late airplanes the upper recognition light has been deleted.

12. MISCELLANEOUS EQUIPMENT.

a. PILOT'S RELIEF TUBE.—The relief tube horn is stowed on a bracket on the floor of the cockpit at the left of the pilot's seat.

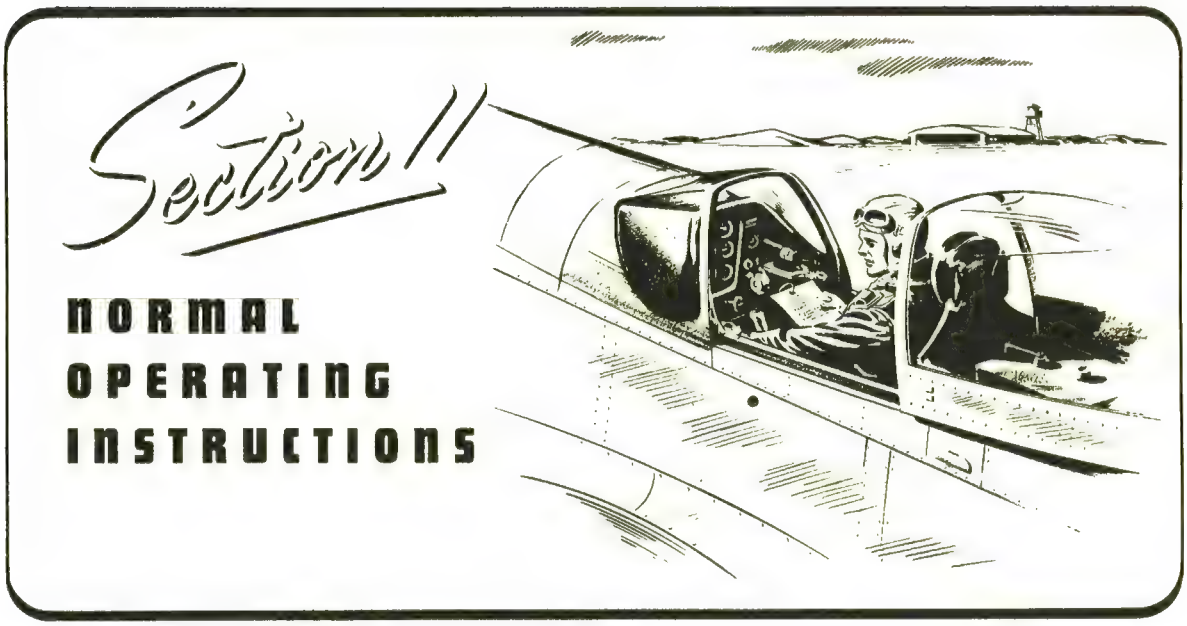
b. ENGINE CRANK.—Early airplanes have an engine crank and extension tube stowed in brackets at the back of the right main landing gear well. On late airplanes, these parts have been deleted.

c. DROP MESSAGE BAG.—A drop message bag is contained in a holder on the map case cover.

d. DATA CASE AND TAIL POSITION LIGHT LENSES.—A data case is fastened to the access door on the underside of the fuselage, just forward of the tail wheel. On late airplanes, a case containing three tail position light lenses (red, green, and clear) is accessible through this door.

e. ARM REST.—A folding arm rest is on the left longeron, aft of the engine control quadrant.

f. ANTI-G SUIT PROVISIONS.—An air pressure outlet connection on the left side of the pilot's seat provides for attachment of the air pressure intake tube of the anti-G suit. Air pressure for the inflation of the anti-G suit bladders is supplied from the exhaust side of the engine-driven vacuum pump, and is regulated by a type M-2 valve which is a junction point for pressures exerted in both the droppable combat fuel tanks and the anti-G suit. If combat tanks are installed on the airplane, the acceleration force (G load) required to actuate the M-2 valve should be approximately 3 to 3½ G's because of the approximate 5-pound-per-square-inch pressure exerted in the tanks. Without the combat tanks installed, the valve should open at 2 G's. After the valve opens, pressure is passed through a regulator valve into the suit in proportion to the G force imposed. For every 1 G acceleration force, a corresponding one-pound-per-square-inch air pressure is exerted in the anti-G suit.



1. BEFORE ENTERING COCKPIT.

a. Note carefully the following:

FLIGHT RESTRICTIONS

1. When external fuel tanks are installed, only normal flying attitudes are permitted.
2. Inverted flying must be limited to 10 seconds because of loss of oil pressure and failure of the scavenge pumps to operate in an inverted position.
3. No acrobatics are permitted with more than 40 gallons of fuel in the fuselage tank.
4. Intentional "power-off" spins are permitted, provided such spins are started above 12,000 feet. Intentional "power-on" spins and snap rolls are prohibited. It is impossible to do a good snap roll with the airplane, and most attempts usually end up in a power spin.
5. Slow rolls are prohibited if the airplane is not equipped with a dorsal fin and reverse boost rudder tab.
6. If 110-gallon combat tanks or 1000-pound bombs are installed, airplane is restricted to level flight until tanks or bombs are released.

AIRSPEED LIMITATIONS

1. The maximum permissible speed is 505 IAS or .75 Mach, whichever is less. See figures 26 or 27 for diving speed limits at altitude.
2. Observe the following wing flap setting airspeed restrictions:

   With wing flap setting at 10 degrees, do not exceed 400 IAS.
   With wing flap setting at 20 degrees, do not exceed 275 IAS.
   With wing flap setting at 30 degrees, do not exceed 225 IAS.
   With wing flap setting at 40 degrees, do not exceed 180 IAS.
   With wing flap setting at 50 degrees, do not exceed 165 IAS.

3. In a sideslip, stay above 110 IAS.
4. Do not extend landing gear above 170 IAS.
5. With droppable 75-gallon combat fuel tanks installed, speed is limited to about 400 IAS due to incipient buffeting.

THESE LIMITATIONS MAY BE SUPPLEMENTED OR SUPERSEDED BY INSTRUCTIONS INCLUDED IN SERVICE PUBLICATIONS.

b. Make sure the airplane has been serviced and is ready for flight, particularly in regard to proper quantities of fuel, oil, coolant, hydraulic fluid, and oxygen.

c. Ascertain that the total weight of fuel, oil, ammunition, and special equipment carried is suited to the mission to be performed. This is most important on combat missions. as the rate of climb of the airplane may vary as much as 500 feet per minute, depending on the load carried.

d. See that external power supply (if available) is connected.

e. Prior to any ground run-up exceeding 40 in. Hg manifold pressure, see that the tail of the airplane is anchored securely to a fixed object. If wheel chocks are available, use them also.

f. To gain access to cockpit, push in on spring-loaded door on left forward side of sliding canopy, and slide canopy aft.

CAUTION

In order to avoid cracking the windshield panels, do not grasp the windshield frame when entering or leaving the airplane.

2. ON ENTERING COCKPIT.

Note

A pilot's check list and an engine limitations plate are provided in the cockpit for a quick check of airplane operations.

a. Perform the following operations prior to all flights:

(1) Adjust rudder pedals for proper leg length to obtain full brake control while taxiing. Press foot against the lever on the inner side of each rudder pedal. *(See figure 6.)*

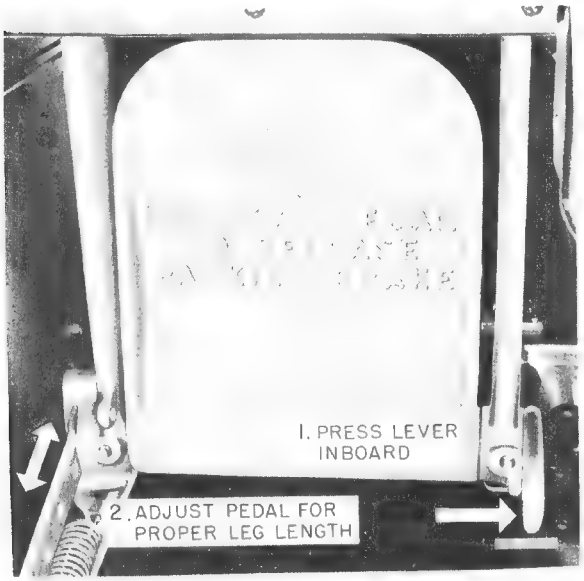


Figure 6—Rudder Pedal Adjustment

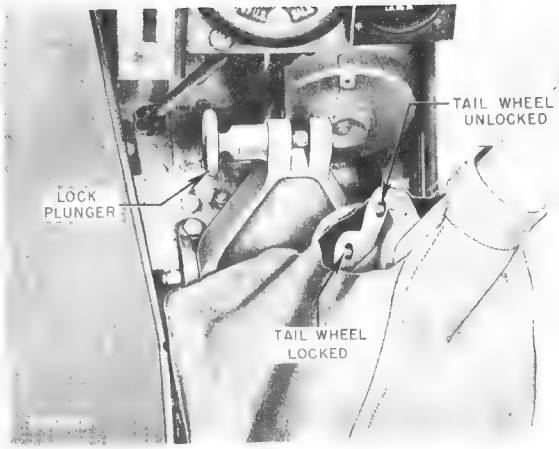


Figure 7—Surface Control Lock

(2) Adjust the seat level to obtain full travel of the rudder pedals in the extreme positions. The adjustment lever is on the right side of the seat.

(3) See that ignition switch is "OFF."

(4) Set parking brakes.

(5) See that the bomb and gun safety switches are "OFF."

(6) See that landing gear control handle *(figure 3—item 57)* is in the "DOWN" position.

(7) Unlock surface control lock at the base and just forward of the control stick by pulling the plunger on left side of the lock. *(See figure 7.)* Check the controls for free and proper movement, watching control surfaces for correct response.

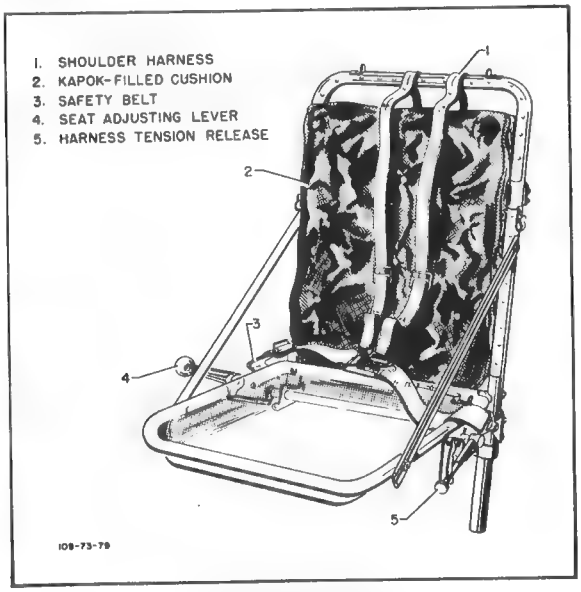


Figure 8—Pilot's Seat

(8) Set altimeter to correct barometric pressure.

(9) Check remote-reading compass for correct reading.

(10) Turn "ON" generator-disconnect switch. *(See figure 4—item 66.)* If external power is not used, turn "ON" battery-disconnect switch. *(See figure 4—item 65.)*

(11) Check landing gear warning lights by pushing lamp housing or push-to-test switch.

(12) Test gun sight illumination by operating rheostat control. (Gun safety switch must be on "SIGHT AND CAMERA" or "GUNS, SIGHT, AND CAMERA.")

(13) Turn "OFF" generator-disconnect switch. (If battery-disconnect switch is "ON," turn it "OFF.")

(14) Close sliding canopy. *(See figures 9 and 10.)*

b. When night flying is anticipated, make the following additional checks with the generator-disconnect switch "ON." (If no external power, battery-disconnect switch "ON.")

(1) Test fluorescent instrument lights by operating rheostat controls. The control for the left light is on the radiator air control panel; the control for the right light is on the right-hand switch panel.

(2) Test position lights by moving switch on right-hand switch panel to "BRIGHT" and "DIM."

(3) Test landing light by operating switch on radiator air control panel.

(4) Test cockpit swivel lights by turning on switch located on lamp housing. The cockpit light master switch on the front switch panel must be "ON" before turning on the lights.

(5) Test operation of recognition lights; the switches are on the right-hand switch panel. The keying switch is on the right longeron.

Note

Do not operate recognition lights longer than 10 seconds on the ground.

(6) Turn "OFF" generator-disconnect switch. (If battery-disconnect switch is "ON," turn it "OFF.")

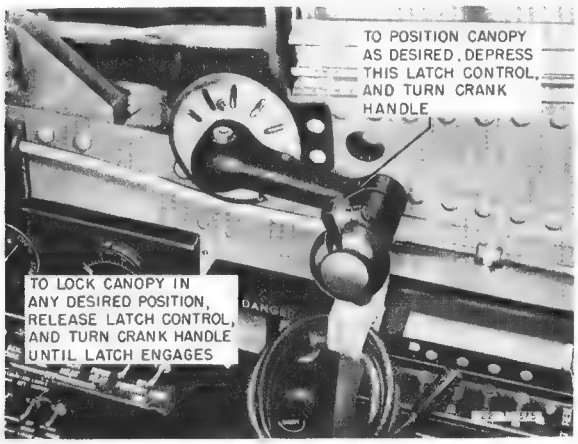


Figure 9—Sliding Canopy Operation—Late Airplanes

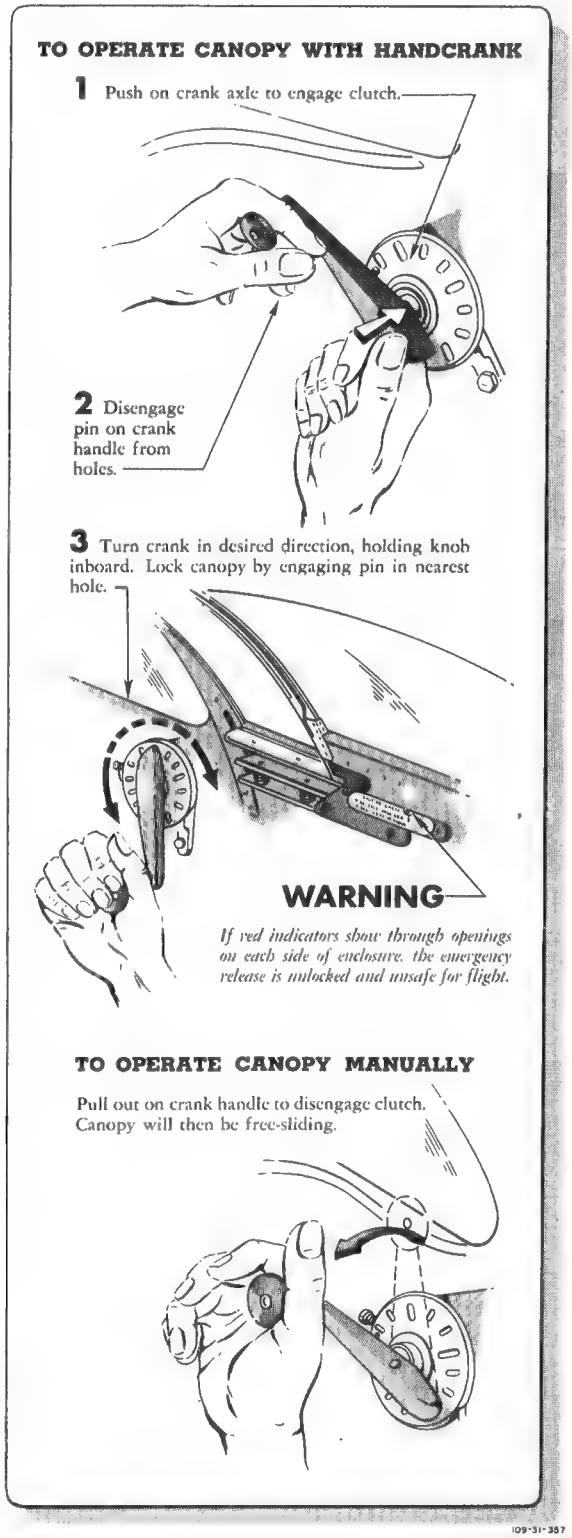


Figure 10—Sliding Canopy Operation—Early Airplanes

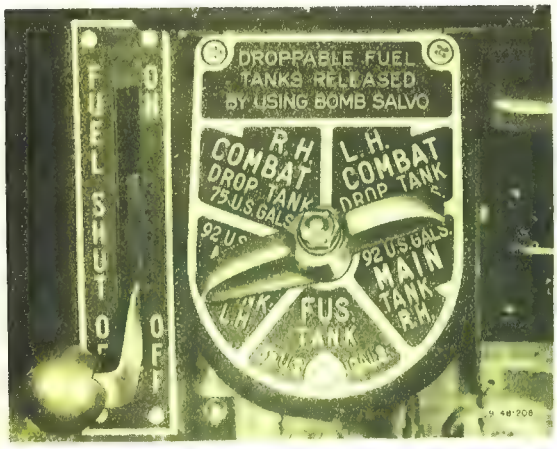


Figure 11—Fuel Selector Control

3. FUEL SYSTEM MANAGEMENT.

CAUTION

Keep fuel booster pump operating at all times during flight to ensure adequate fuel pressure. The electrical circuit is connected through a switch to the fuel selector valve; therefore, turning the valve from one position to another automatically shuts off the booster pump in the tank formerly used and starts the pump in the tank selected, provided that the booster pump switch is "ON" ("NORMAL" or "EMERGENCY" in early airplanes).

a. Take off and climb with the fuel selector on "MAIN TANK L.H.," and the booster pump switch in "EMERGENCY" (early airplanes) or "ON" (late airplanes).

b. When a safe altitude has been reached, move the booster pump switch to "NORMAL" (early airplanes) or leave at "ON" (later airplanes), move fuel selector to "FUS. TANK," and cruise on the fuselage tank fuel until only 25 gallons remain.

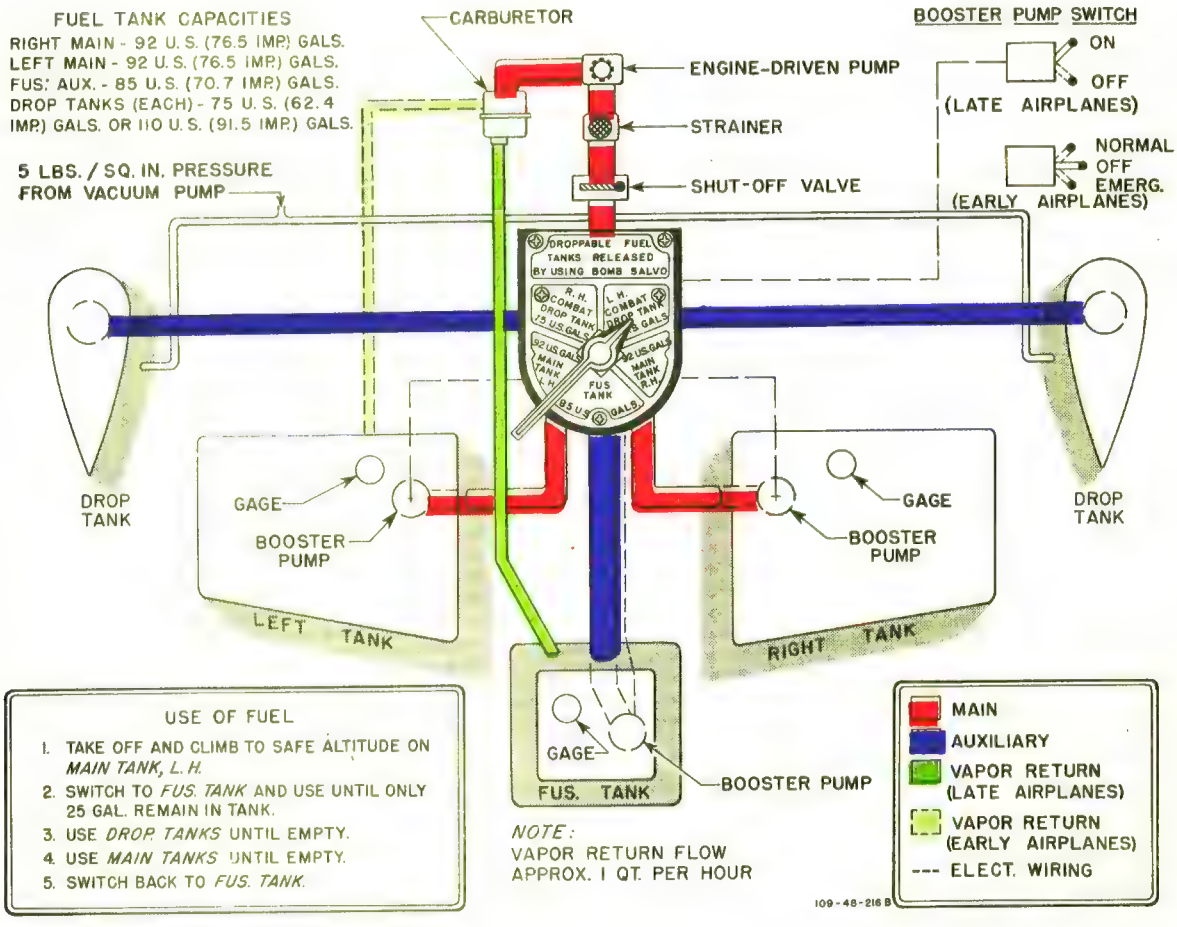


Figure 12—Fuel System Line Diagram

WARNING

The carburetor vapor return line feeds to the fuselage tank on later airplanes (to the left-hand main tank on early airplanes); therefore, it is necessary to use fuel from the fuselage tank first.

CAUTION

Retain approximately 25 gallons in the fuselage tank to keep the CG of the airplane in the optimum position for landing.

c. After draining the fuselage tank to 25 gallons, move the fuel selector to either of the droppable tank positions and use fuel from them alternately until they are empty.

Note

The combat tanks have no booster pump; a controlled pressure of 5 pounds per square inch is maintained within them by the exhaust side of the vacuum pump.

d. Switch fuel selector to "MAIN TANK L.H." or "MAIN TANK R.H."; then alternately use fuel from the left and right main tanks until the wing tanks are empty, to avoid wing heaviness.

e. When wing tanks are empty, switch fuel selector back to "FUS. TANK."

4. STARTING ENGINE.

a. Follow this procedure when starting the engine.

(1) See that ignition switch is "OFF."

(2) See that mixture control is in "IDLE CUT OFF."

(3) Have ground personnel pull the propeller through 8 blades.

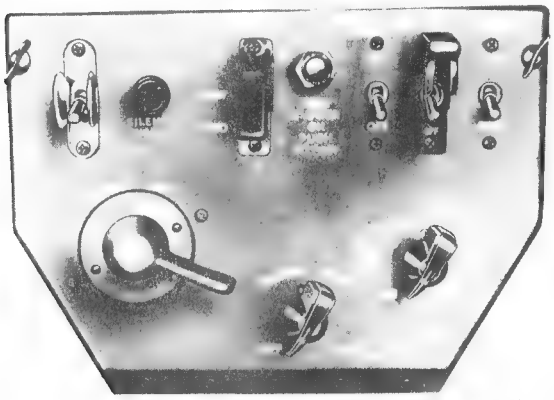


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Figure 13—Front Switch Panel—Early Airplanes

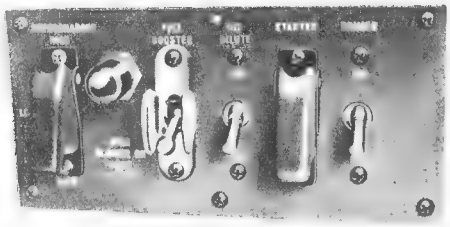

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Figure 14—Engine Control Panel—Airplanes With Zero Rail Rocket Installation

(4) Turn "ON" generator-disconnect switch. *(See figure 4-item 66.)* If external power supply is not used, turn "ON" battery-disconnect switch. *(See figure 4-item 65.)*

(5) Open throttle one inch (early airplanes) or to "START" position (late airplanes). *(See figure 19.)*

(6) Move propeller control to full "INCREASE RPM."

(7) On early airplanes, make certain boost control, at lower left side of instrument panel, is in "AUTOMATIC." On late airplanes, see that throttle gate is safety wired.

(8) See that supercharger blower switch is in "AUTO."

(9) Turn oil and coolant radiator air control switches at left side of cockpit to "AUTOMATIC."

(10) Move carburetor air control, at aft end of control pedestal, to "RAM AIR." ("UNRAMMED FILTERED AIR," or "UNRAMMED HOT AIR," if required.)

(11) Turn "ON" fuel shut-off control, adjacent to the fuel selector *(figure 11)*, and turn fuel selector to "MAIN TANK L.H."

(12) Switch booster pump to "ON" (late airplanes) or "NORMAL" (early airplanes). Check booster output on fuel pressure gage: 10-14 pounds per square inch, "ON"; 8-12 pounds per square inch, "NORMAL."

(13) *Electric prime:* three to four seconds when cold, one when hot (late airplanes). *Hand prime:* three to four strokes when cold, one when hot (early airplanes).

(14) Make sure propeller is clear.

(15) Turn ignition switch to "BOTH."

(16) Lift guard on starter switch, and press switch to "START."

Note

Whenever possible, use an external power supply to start the engine. Use airplane's battery in an emergency only.

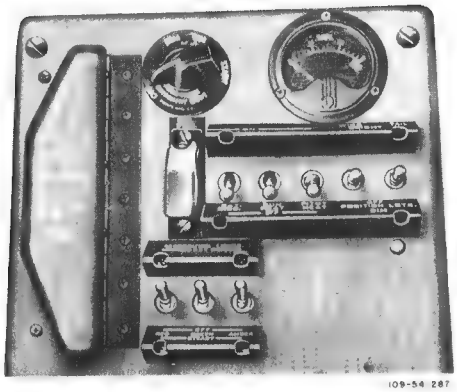


Figure 15—Right Switch Panel

(17) As engine starts, move mixture control to "AUTO RICH" or "RUN." If engine does not start after several turns, continue priming.

CAUTION

Leave mixture control in "IDLE CUT OFF" until engine fires. After firing, if engine does not start, move mixture control back to "IDLE CUT OFF" position.

(18) Check oil pressure. If pressure is not up to 50 pounds within 30 seconds, stop engine and investigate.

5. WARM-UP AND GROUND TEST.

CAUTION

During ground check, do not run up engine with surface controls in a locked position.

a. Warm up the engine at 1300 rpm until the oil temperature shows a definite increase and the oil pressure remains steady when the throttle is opened. The desired oil and coolant temperatures will be maintained by having the radiator air controls in "AUTOMATIC."

If coolant and oil temperatures exceed limits with controls in "AUTOMATIC," shut engine off and investigate.

b. Keep the flight indicator uncaged at all times except during maneuvers which exceed operating limits.

Note

If horizon bar on flight indicator is not level after engine is started, cage gyro momentarily.

c. After the engine has been warmed up sufficiently, proceed with these tests:

(1) Check both left and right main, and fuselage fuel systems by rotating fuel selector with booster pump switch in "ON" or "EMERGENCY." Check fuel pressure within limits. If combat tanks are installed, momentarily switch to each combat tank position several times to permit air trapped in the combat tank lines to bleed into the main system. Then check each position for smooth operation of the engine.

(2) Check operation of wing flaps.

(3) Check operation of radiator air outlet flaps (with assistance of outside observer) using override positions of radiator air control switches. Return switches to "AUTOMATIC."

(4) Check communication equipment for proper operation.

(5) At 2300 rpm, check the following:

Suction	3.75-4.25 in. Hg
Hydraulic pressure	800-1100 lbs./sq. in.
Ammeter	100 amperes maximum

(6) Check the instruments for desired ranges.

Figure 16—Radiator Air Control Panel

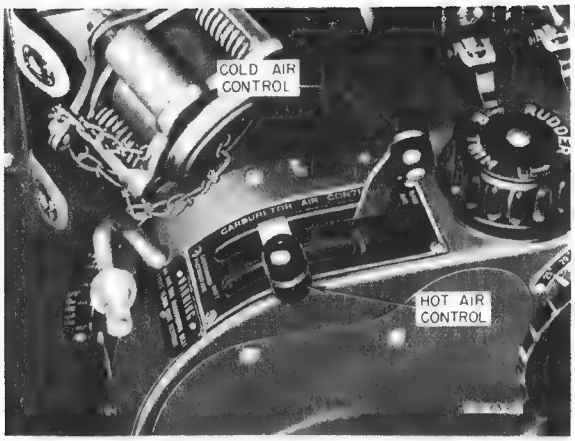


Figure 17—Carburetor Air Controls—Late Airplanes

(7) With propeller control in full "INCREASE RPM," set throttle control to obtain 2300 rpm. Move propeller control back to note maximum drop of 300 rpm. Then move forward to full "INCREASE RPM."

(8) Check supercharger operation: With propeller control at full "INCREASE RPM," engine speed 2300 rpm, hold supercharger switch in "HIGH." Note rpm drop (at least 50 rpm).

(9) With propeller control in full "INCREASE RPM" and engine speed 2300 rpm, check each magneto. Maximum allowable drop in rpm is 100 on right magneto and 130 on left magneto.

(10) Pull throttle control back to idle engine.

(11) Have ground personnel release tail, remove wheel chocks, and disconnect external power supply.

(12) If battery-disconnect switch was "OFF" (while using external power supply), turn it "ON" now.

6. SCRAMBLE TAKE-OFF.

Use oil dilution (3 minutes maximum) to obtain proper oil pressure at moderate power, and as soon as the engine will take the throttle, taxi out, and take off.

Note

Overdilution is likely to result under these conditions because of low oil flow and a cold engine, which holds back evaporation. If dilution is used, observe the oil pressure closely during the time of dilution and take-off to determine whether or not the oil has been overdiluted. Overdilution will cause low oil pressure, and loss of oil through the engine breathers.

7. TAXIING INSTRUCTIONS.

a. Raise the wing flaps, to prevent damage to them.

CAUTION

Taxi cautiously, to avoid damage from objects which the tires might pick up and throw against the radiator air outlet flaps.

b. Steer a zigzag course to obtain an unobstructed view.

c. Taxi with the stick slightly aft of neutral to lock the tail wheel. In the locked position, the tail wheel may be turned 6 degrees to the right or left with the rudder pedals. For sharp turns, push the stick forward of the neutral position to allow the tail wheel full-swiveling action.

d. Use the brakes as little as possible.

e. Upon reaching the take-off position, stop the airplane at right angles to the runway so that approaching airplanes may be plainly seen.

8. BEFORE TAKE-OFF.

a. Trim airplane as follows: Rudder trim, 5 degrees right; aileron trim, 0 degrees; metal elevator trim, 26 percent aft CG —2 degrees "NH," 31 percent aft CG —4 degrees "NH"; fabric elevator trim, 26 percent aft CG —2 degrees "TH," 31 percent aft CG —0 degrees.

b. Check flying controls for free movement (look at control surfaces).

c. Check fuel levels.

d. See that fuel selector is set on "MAIN TANK L.H.," and that booster pump switch is in "ON" or "EMERGENCY".

e. Generator-disconnect switch "ON."

f. Mixture control "AUTO RICH" or "RUN."

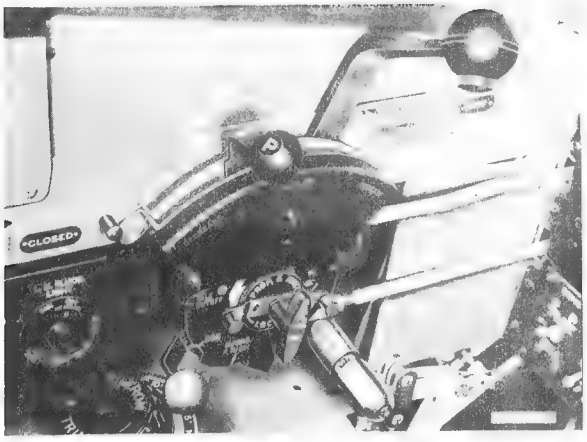


Figure 18—Engine and Propeller Controls—Early Airplanes

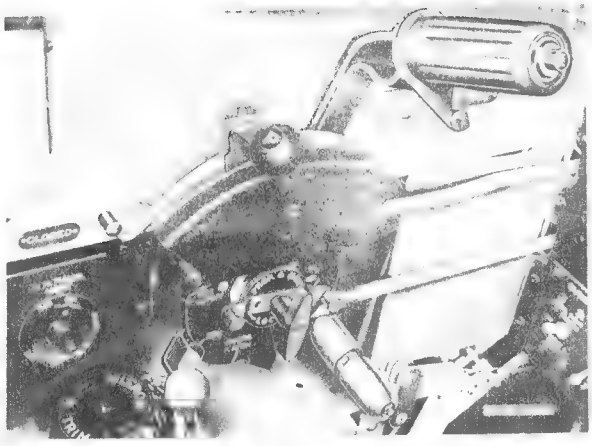


Figure 19—Engine and Propeller Controls—Late Airplanes

g. Propeller control at full "INCREASE RPM."

h. Supercharger blower switch "AUTO."

i. Oil and coolant radiator air controls "AUTOMATIC."

j. Boost control "AUTOMATIC" (early airplanes only).

k. Carburetor air control "RAM AIR." ("UNRAMMED FILTERED AIR" or "UNRAMMED HOT AIR," if required.)

l. See that cockpit enclosure is locked and that emergency release handle is safetied.

m. If it is necessary to wait at the take-off position for a long period, recheck the magnetos at 2500 rpm with the propeller control at full "INCREASE RPM."

9. TAKE-OFF.

a. Make sure take-off area is clear.

b. Wing flaps 15 to 20 degrees down for best obstacle clearance.

c. Oil pressure within limits.

d. Oil temperature within limits.

e. Coolant temperature within limits.

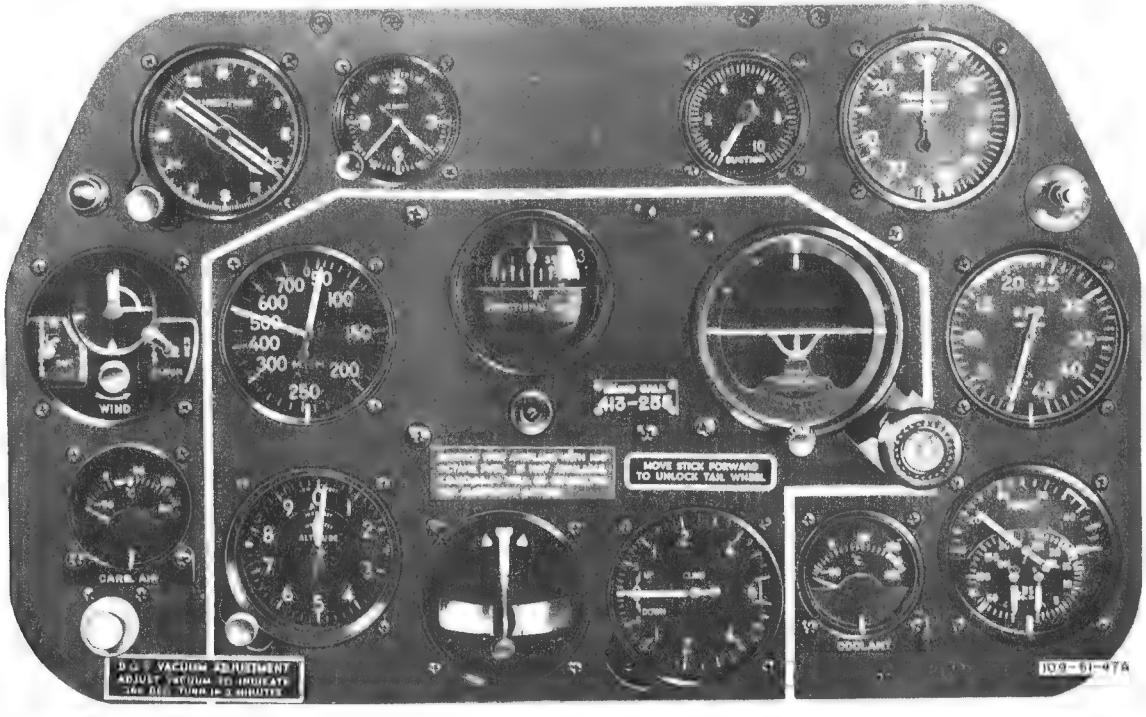


Figure 20—Instrument Panel—Early Airplanes

f. Open throttle to gate—61 in. Hg at 3000 rpm (5 minutes maximum), and take off.

Note

It is recommended that 61 in. Hg and 3000 rpm be used for all take-offs and that this power setting be reached as quickly as possible after starting the take-off run.

g. Do not attempt to lift the tail too soon, as this increases the torque action. Pushing the stick forward unlocks the tail wheel, thereby making steering difficult. The best take-off procedure is to hold the tail down until sufficient speed is attained, and then raise the tail slowly.

TAKE-OFF SPEEDS

9,000 lbs. (no external load)	95 IAS
10,000 lbs. (external load)	103 IAS
11,000 lbs. (external load)	110 IAS

See Take-off, Climb, and Landing Charts for further information.

10. ENGINE FAILURE DURING TAKE-OFF.

a. The chances of engine failure during take-off can be greatly reduced if the engine is run up carefully and checked thoroughly beforehand.

b. The hazards due to engine failure during take-off can be minimized by observing the following practices:

(1) Retract the landing gear as soon as the airplane is definitely airborne.

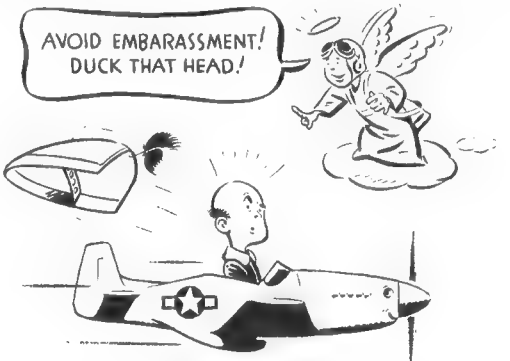
(2) Raise the flaps as soon as the airplane reaches a safe altitude.

c. If the engine fails immediately after take-off, act quickly as follows:

(1) Depress the nose at once so that the airspeed does not drop below stalling speed.

(2) If external fuel tanks or bombs are installed, release them immediately.

(3) Release the sliding canopy by pulling the emergency release handle on top of the longeron, at the right of the instrument panel.



WARNING

Before emergency release of canopy in flight, drop seat and lower head as far as possible. If excessive force was used in securing the canopy prior to take-off, it may be necessary to crank the canopy back enough to relieve the pressure against the windshield before the emergency release will be effective.

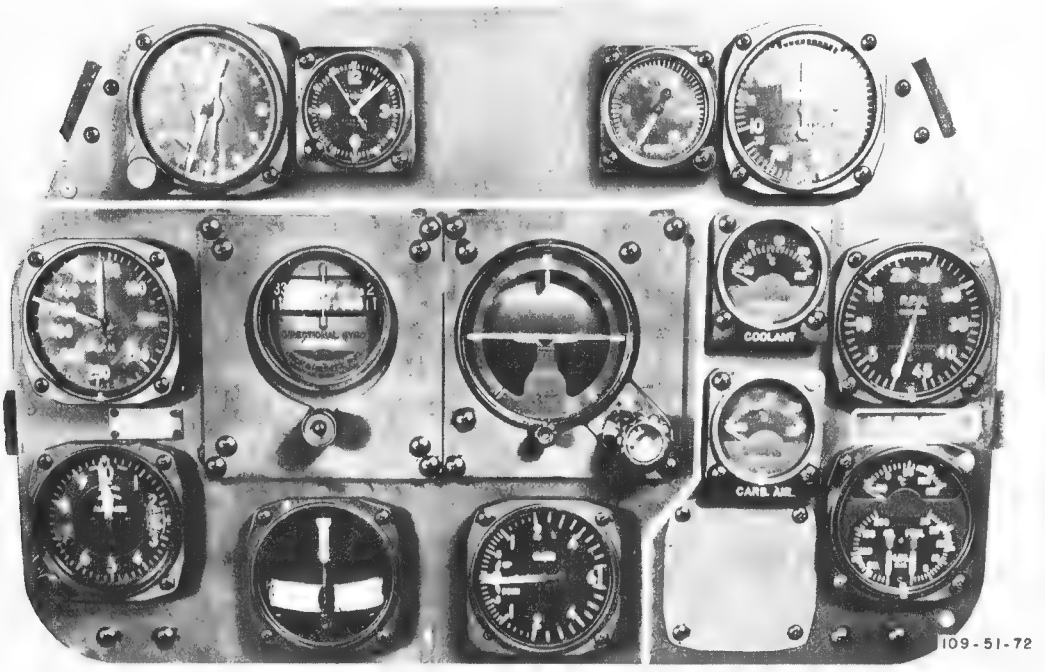


Figure 21—Instrument Panel—Late Airplanes

(4) When a reasonable doubt exists as to the condition of the terrain on which you are being forced to land, or if there is a probability of the airplane nosing over or overrunning the available landing area, retract the landing gear.

(5) Lower the flaps fully, if possible.

(6) Move mixture control to "IDLE CUT OFF" and turn ignition switch "OFF."

(7) Turn fuel shut-off control "OFF."

(8) Turn battery-disconnect switch "OFF."

(9) Land straight ahead, only changing directions sufficiently to miss obstructions.

(10) After landing, get out of the airplane as quickly as possible and remain outside.

11. CLIMB.

a. As soon as the airplane is sufficiently clear of the ground, proceed as follows:

(1) Pull the landing gear control handle inboard and up to retract the gear. Check position of gear by warning lights at left of instrument panel.

WARNING

Do not apply brakes after take-off to stop rotation of wheels, as brake discs may seize.

(2) Raise the flaps by pulling flap control to the full up position when sufficient airspeed is attained and all obstacles are cleared. No sink is noticeable when the flaps are raised.

(3) Check the coolant and oil temperatures, and the oil pressure.

Note

As the rate of climb can vary widely, depending on weight carried, external loading, and altitude, refer to Take-off, Climb, and Landing Charts for the rate of climb applicable to the particular mission to be conducted.

12. DURING FLIGHT.

a. GENERAL.

(1) As soon as desired altitude is attained, turn booster pump switch to "NORMAL" (early airplanes only).

CAUTION

Keep booster pump "ON" (late airplanes) or "NORMAL" (early airplanes) at all times during flight.

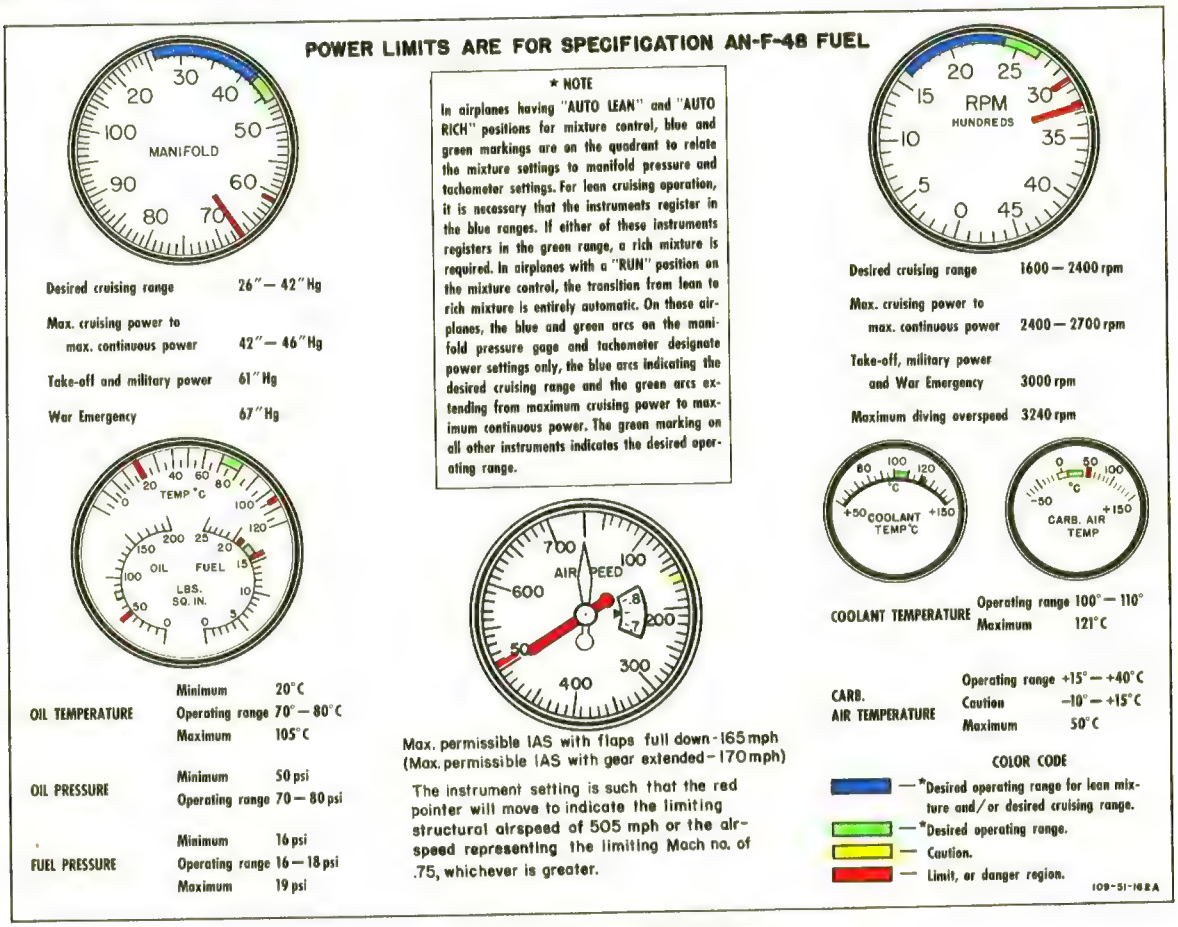


Figure 22—Instrument Limitations

(2) Set throttle and propeller controls to desired manifold pressure and rpm.

(3) Periodically check for the desired instrument readings.

Note

With the radiator air controls set in the "AUTOMATIC" position, the coolant temperature will be approximately 100°-110°C and the oil temperature will be approximately 70°-80°C. It should be noted that with very high powers on hot days, even though the radiator air controls are in the "AUTOMATIC" position, these temperature limits may be exceeded because the outlet flaps are in the full open position, making it impossible for the automatic control to maintain the desired temperature limits.

(4) For engine operation, see Power Plant Chart, section III, and Flight Operation Instruction Charts, appendix I.

Note

To ensure the lowest fuel consumption on a long-range mission, it is recommended that the highest manifold pressure consistent with Flight Operation Instruction Charts be used with any given rpm setting. However, to minimize lead fouling of spark plugs consequent to prolonged cruising at low power (especially in the range from 1600 to 1900 rpm), it is also recommended that a high power (3000 rpm and 61 in. Hg) be used for one minute every 30 minutes when the fuel supply is adequate.

WARNING

Do not use carburetor heat on V-1650-3 and V-1650-7 engines at altitudes above 12,000 feet. This precaution is necessary because heat has an adverse (leaning) effect on the carburetor altitude compensator mechanism above this altitude.

b. WAR EMERGENCY RATING.

(1) GENERAL.

(a) The War Emergency Rating given on the Power Plant Charts has been established to make available in combat the absolute maximum manifold pressure at which

Figure 23 deleted in revision dated 17 December 1947.

Figure 23—Engine and Airplane Limitations

the engine may be operated, within reasonable safety limits, for a 5-minute period under emergency conditions.

(b) This rating is considerably higher than the ratings given in the engine specification under which the engine was delivered. Since its use will decrease the engine's normal service life and time between overhauls, the War Emergency Rating should be held for use *only when emergency conditions exist.* The War Emergency Rating is not a guaranteed power rating; it is a maximum manifold pressure rating as established by the correct setting of the automatic manifold pressure regulator and the correct setting of the propeller governor to allow the propeller to turn at 3000 rpm.

(c) Use of the War Emergency Rating is permissible only when the following requirements are fulfilled:

1. The airplane must be in combat or precombat areas, as designated by the AAF

2. Specification No. AN-F-48, Grade 100/130 fuel must be used.

3. KLG RC5/3, Lodge RS5/5, or AC LE-44 spark plugs must be installed.

4. A break-through seal must be installed on the emergency boost control (early airplanes) or at the gate (late airplanes) to inform the crew chief that the engine has been operated at War Emergency Rating.

Note

Entry shall be made on Form 1A of time of war emergency power operation for close coordination with ground engineering officer.

5. The airplane must be placarded with a decal stating that use of the War Emergency Rating is permitted.

(2) OPERATION.—If it is necessary to use the War Emergency Rating, proceed as follows:

(a) Check mixture control. On late airplanes, the mixture control will be in "RUN"; on early airplanes, the mixture control will be in "AUTO RICH."

(b) Move propeller control to full "INCREASE RPM."

(c) Advance throttle to full open position (beyond gate on late airplanes).

(d) Pull out on boost control lever (early airplanes).

(e) Use war emergency power for 5 minutes maximum. Do not permit coolant outlet temperature to exceed 121°C. Oil inlet temperature must not exceed 105°C.

CAUTION

If the oil has been diluted, it is desirable to operate the engine 10 to 15 minutes at from 80 percent normal to military power before using the War Emergency Rating.

(f) To return to normal power operations:

1. Push boost control lever in (early airplanes).

2. Set throttle and propeller controls to give desired manifold pressure and rpm.

13. ENGINE FAILURE DURING FLIGHT.

Follow instructions in section IV, paragraph 3.

14. FLYING CHARACTERISTICS.

a. GENERAL.—The airplane is stable at all normal loadings, but the directional trim changes at low speeds as speed and horsepower output are varied. The trim tab controls are sensitive and must be used carefully. The effect of flap and landing gear operation on the trim of the airplane in flight is as follows:

Landing gear extended—airplane becomes nose heavy.
Flaps lowered—airplane becomes nose heavy.

b. CHARACTERISTICS OF ELEVATOR BOBWEIGHT.—With the fuselage tank filled, the center of gravity of the airplane is moved so far aft that flying characteristics become unsatisfactory. Stick forces tend to reverse when the airplane enters a tight turn or pull-out, making it necessary for the pilot to exert considerable forward pressure on the stick to prevent further tightening of the turn or pull-out. In order to reduce this tendency, a bobweight has been added to the elevator system to increase the normal stick forces under accelerated flight conditions. When not more than 25 gallons remain in the fuselage fuel tank, combat maneuvers may be made without as great a danger of overaccelerating the airplane due to low stick forces. However, with the fuselage tank full, it is still necessary to exercise extreme care in flying and to avoid accelerated flight. Keep in mind that the restrictions given in paragraph 1. *a.* still apply.

15. STALLS.

The stall in this airplane is comparatively mild. The airplane does not whip at the stall but rolls rather slowly, and has very little tendency to drop into a spin. When the stick and rudder are released, the nose drops sharply, and the airplane recovers from the stall almost instantly. When a complete stall is reached, a wing will drop. If you keep pulling back on the stick when the wing drops, the airplane will fall into a steep spiral. In a straight power-off stall, some warning

is given about 3 to 4 mph above the stall by slightly elevator buffet. A high-speed stall is preceded by sharp buffeting at the elevators and wing root, but recovery is almost immediate when pressure on the stick is released. Recovery from any stall is entirely normal: Release the back pressure on the stick and apply opposite rudder to pick up the dropping wing. The speed at which a stall occurs can vary widely, depending on the gross weight and external load of the airplane.

STALLING SPEEDS

With or Without Wing Racks (No External Load)

GEAR AND FLAPS UP			
Gross Weight	9500	8500	7500
IAS (mph)	103	97	91
GEAR AND FLAPS DOWN			
Gross Weight	9500	8500	7500
IAS (mph)	96	90.5	85
With Wing Bombs or Combat Tanks			
GEAR AND FLAPS UP			
Gross Weight	11,000	10,000	9000
IAS (mph)	113	107.5	102
GEAR AND FLAPS DOWN			
Gross Weight	11,000	10,000	9000
IAS (mph)	103	98	93

16. SPINS.

a. POWER-OFF SPINS. *(See figure 24.)*

(1) DESCRIPTION.

(a) In general, spins in this airplane are uncomfortable due to heavy oscillations. Occasionally the left spin will dampen out after approximately three turns, but the right spin continues with an oscillatory action.

(b) Upon applying controls to start a spin, the airplane snaps ½ turn in the direction of spin with the nose dropping to near vertical. At the end of one turn, the nose rises to or above the horizon and the spin slows down, occasionally coming almost to a complete stop. The airplane then snaps ½ turn with the nose dropping to 50-60 degrees below the horizon and continues as during the first turn.

(c) The force required to hold the controls in the spinning position is quite heavy and some rudder buffet will be noticed.

(d) Upon applying controls for recovery, the nose drops to near the vertical position, the spin speeds up, then stops in 1 to 1¼ turns after recovery controls have been applied.

(2) RECOVERY.—Recovery procedure is the same in both a left and right spin. As soon as you apply opposite rudder, the nose will drop slightly. The spin will speed up rapidly for about 1¼ turns and then stop. The rudder force will be light at first, become very heavy for about one second in the first half turn, and then drop to zero as the spin stops. Recovery is effected in the normal manner, that is, by applying full opposite rudder followed by movement of the stick to neutral.

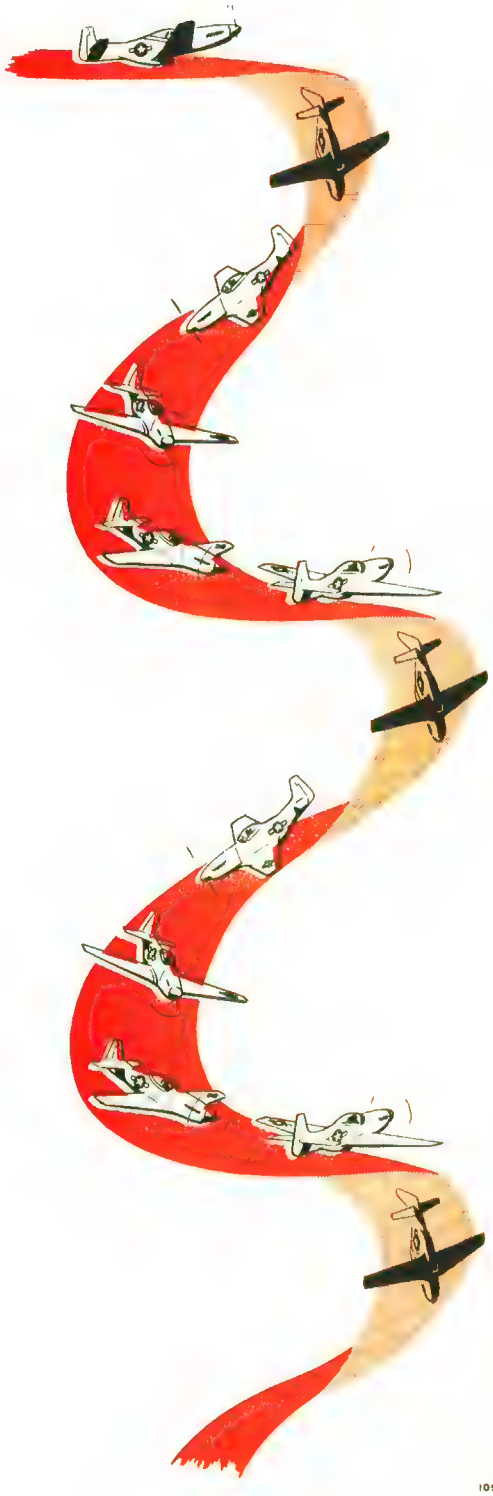


Figure 24—Spin Characteristics

Note

During the spin, a slight rudder buffeting will be noticeable. If you attempt to recover from the dive too soon after the spin has stopped, you will also feel a rather heavy buffeting in both the elevator and rudder. The remedy for this condition is to release some of the pressure you have applied on the stick.

b. POWER-ON SPINS.

(1) DESCRIPTION.—Power-on spins are extremely dangerous in this airplane and should never be intentionally performed. In a power-on spin, the nose of the airplane remains 10-20 degrees above the horizon and recovery control has no effect upon the airplane until the throttle has been completely retarded.

(2) RECOVERY.– Close throttle completely and apply controls for recovery. Hold full opposite rudder with stick in neutral until recovery is effected. As many as 5 or 6 turns of spin will be made after applying controls for recovery and 9000-10,000 feet of altitude will be lost.

17. PERMISSIBLE ACROBATICS.

All acrobatics are permitted, with the exception of snap rolls and power-on spins. Slow rolls are permitted only if the airplane is equipped with a dorsal fin and reverse boost rudder tab. Inverted flying must be limited to 10 seconds because of loss of oil pressure and failure of the scavenge pumps to operate in an inverted position.

18. DIVING.

a. MAXIMUM DIVING SPEEDS.

(1) GENERAL.—At high diving speeds there is danger of the airplane being affected by compressibility—a phenomenon likely to be encountered when the true speed approaches the speed of sound. Compressibility may be indicated by instability of the airplane, uncontrollable rolling or pitching, stiffness of controls, or combinations of these effects. The high-speed dive characteristics of the airplane depend to some extent on the elevator installation. Late airplanes are equipped with metal-covered elevators and a vertical stabilizer with an angle of incidence of ½ degree; all other airplanes have fabric-covered elevators and a vertical stabilizer with an angle of incidence of 2 degrees.

(2) FABRIC-COVERED ELEVATORS.—At a true speed of approximately 75 percent of the speed of sound, airplanes with fabric-covered elevators tend to porpoise. This porpoising starts at approximately the speeds shown in red on figures 26 and 27 and increases in intensity as the airspeed is further increased. Although the airplane does not exhibit any unusual characteristics other than porpoising at the indicated speeds, these limits should not normally be exceeded, since compressibility effects may be evidenced in a more violent manner if allowed to progress. Figures 26 and 27 show the pilot's indicated airspeed corresponding to a true speed of 75 percent of the speed of sound at various altitudes. Note, however, that at the lower altitudes, the speed of sound does not govern, and the limiting speed becomes a structural consideration only.

(3) METAL-COVERED ELEVATORS.—With the metal-covered elevators installed, the longitudinal characteristics remain normal until the true speed of the airplane reaches approximately 76 to 78 percent of the speed of sound. At this speed, the airplane may become slightly nose-heavy because of the effects of compressibility. Inasmuch as further increases in true speed may result in more severe nose-heaviness, diving speed should be limited at this point and recovery started immediately after the change in trim is evident.

b. ALTITUDE REQUIRED FOR PULL-OUT.—Figure 26 shows the minimum safe altitude required for a pull-out from dives, with a constant 4G acceleration. Figure 27 shows the minimum safe altitude required for a pull-out from dives with a constant 6G acceleration (when using anti-G suit).

c. RECOVERY.—If, through necessity or inadvertence, you exceed the diving speed limits shown on figure 26 and pronounced compressibility effects are experienced, ease off on your power and pull up gradually.

WARNING

Be very careful in pull-outs, since the stick forces are relatively light, and an abrupt pull-out may cause structural failure.

The elevator trim tab will normally not be required to aid recovery. However, if found necessary, it should be used with care and in small increments.

19. GLIDING.

Gliding may be carried out at any safe speed down to the recommended margin of about 25 percent above stalling speed. With the landing gear and flaps up, the glide is fairly flat with the nose very high. Forward visibility in this condition is poor. Lowering either the flaps or landing gear, or both, greatly steepens the gliding angle, and the rate of descent is considerably increased.

20. NIGHT FLYING.

Note

On early airplanes, spare bulbs are contained in the small compartment on the right forward side of the cockpit. Disconnect oxygen hose before opening compartment door. On late airplanes, spare bulbs are in clips on the left underside of the instrument shroud.

a. In flying at night, the sequence outlined for daylight operation should be even more strictly observed. In addition, familiarize yourself with the location of the different lights and their control switches, especially the landing light switch.

(1) INSTRUMENT LIGHTING.—Turn on the fluorescent lamps by turning the rheostat knobs (on radiator air control panel and right-hand switch panel) to "START" until the lights come on; then switch to either "ON" or "DIM" position. Rotating the lens housing selects the visible or invisible illumination.

(2) POSITION LIGHTS.—The position light switches are on the right-hand switch panel. Two intensities of light are available: "BRIGHT" and "DIM."

(3) LANDING LIGHT.—The switch for the landing light is located on the radiator air control panel.

(4) COCKPIT LIGHTS.—A cockpit swivel light is on each side of the cockpit. Turn on light by turning switch on lamp housing. The cockpit light switch on the front switch panel must be "ON" before operating the lights.

(5) RECOGNITION LIGHTS.—Set the switches, located on the right switch panel, for the light or combination of lights desired. Place the switches in "STEADY" position for continuous operation and in "KEY" position for intermittent operation, using the keying switch.

21. APPROACH AND LANDING.

(Recommended landing speeds are shown in figure 28.)

a. APPROACH.—When approaching the field, follow this sequence:

Note

It is recommended that military power be used for a short period just prior to landing.

(1) Mixture control "AUTO RICH" or "RUN."

(2) Oil and coolant radiator air controls "AUTOMATIC."

(3) Fuel selector to internal tank with most fuel. Booster pump switch "ON" or "NORMAL."

(4) Propeller control set for 2700 rpm.

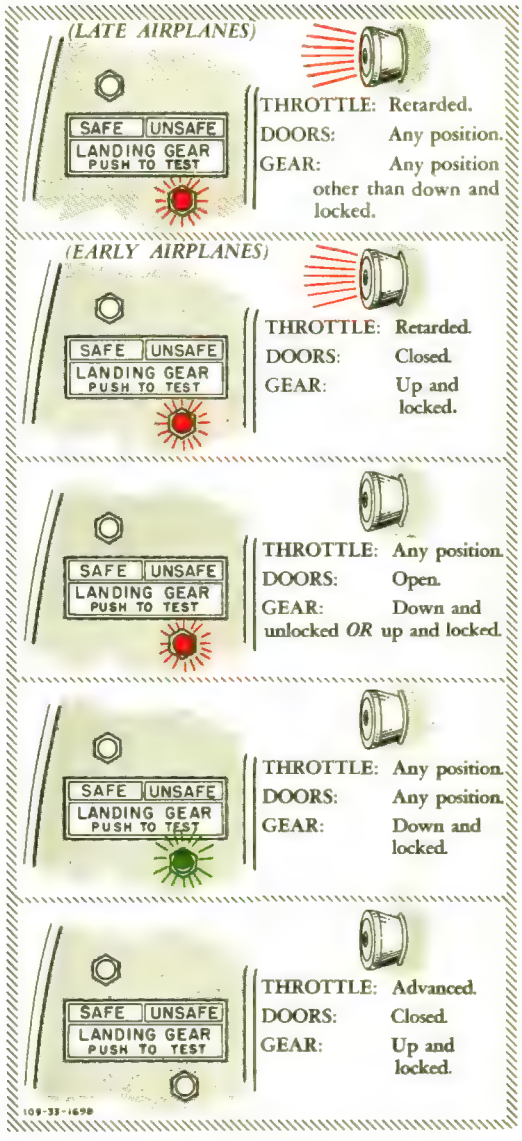


Figure 25—Landing Gear Warning Signals

(5) Lower the landing gear below 170 IAS. Check position of gear by the warning lights at left of instrument panel. On late airplanes, a horn will sound when throttle is retarded with gear up. *(See figure 25.)*

WARNING

After lowering landing gear, do not attempt to raise gear by moving landing gear control to "UP" until the "DOWN" cycle is completed.

(6) If desired, lower the flaps 15 degrees to give a steeper approach angle. When the airplane has been brought into the wind for landing, lower the flaps fully at an altitude of at least 400 feet, provided the indicated airspeed is below 165 IAS and above 100 IAS.

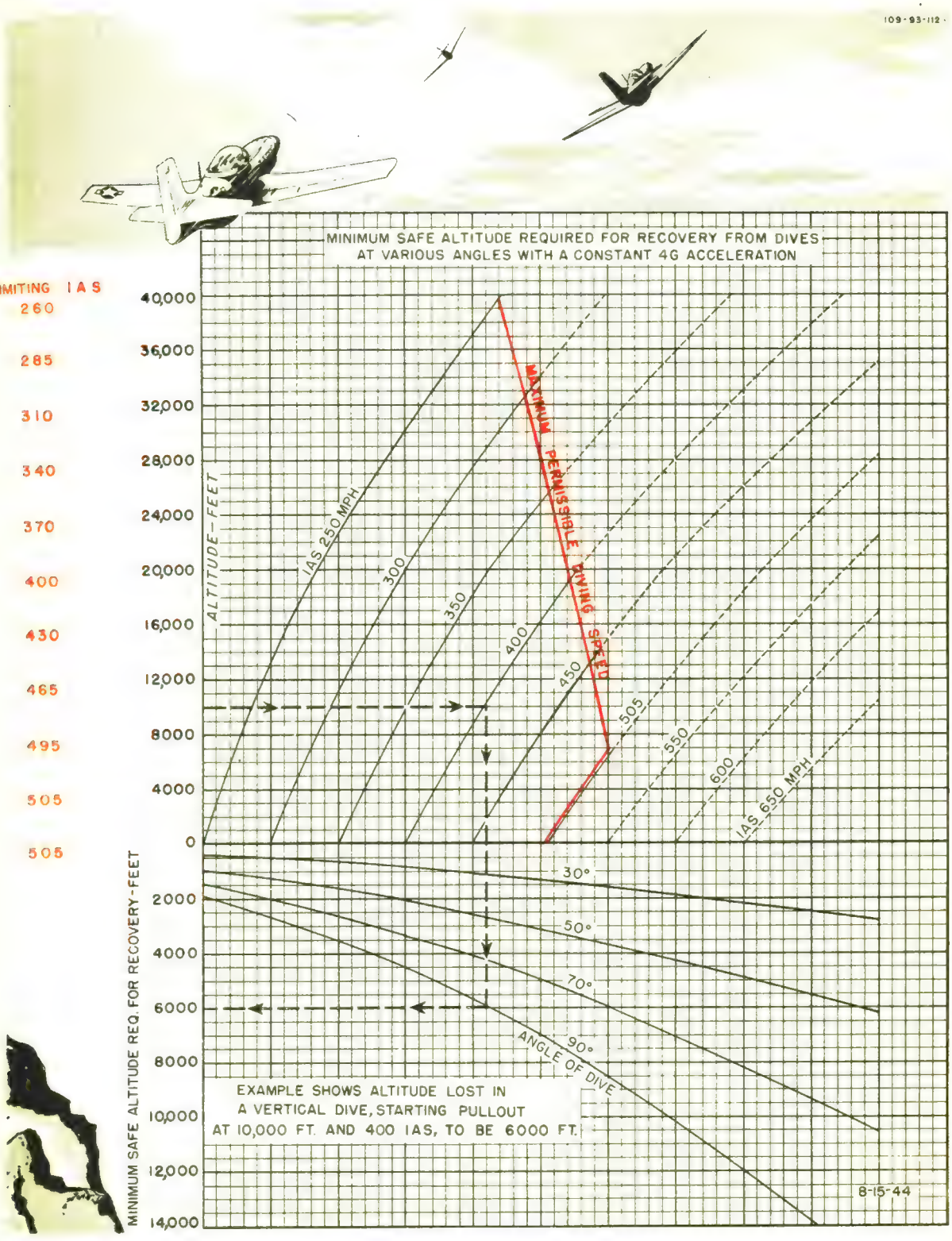


Figure 26—Diving Limitations—4G Pullout

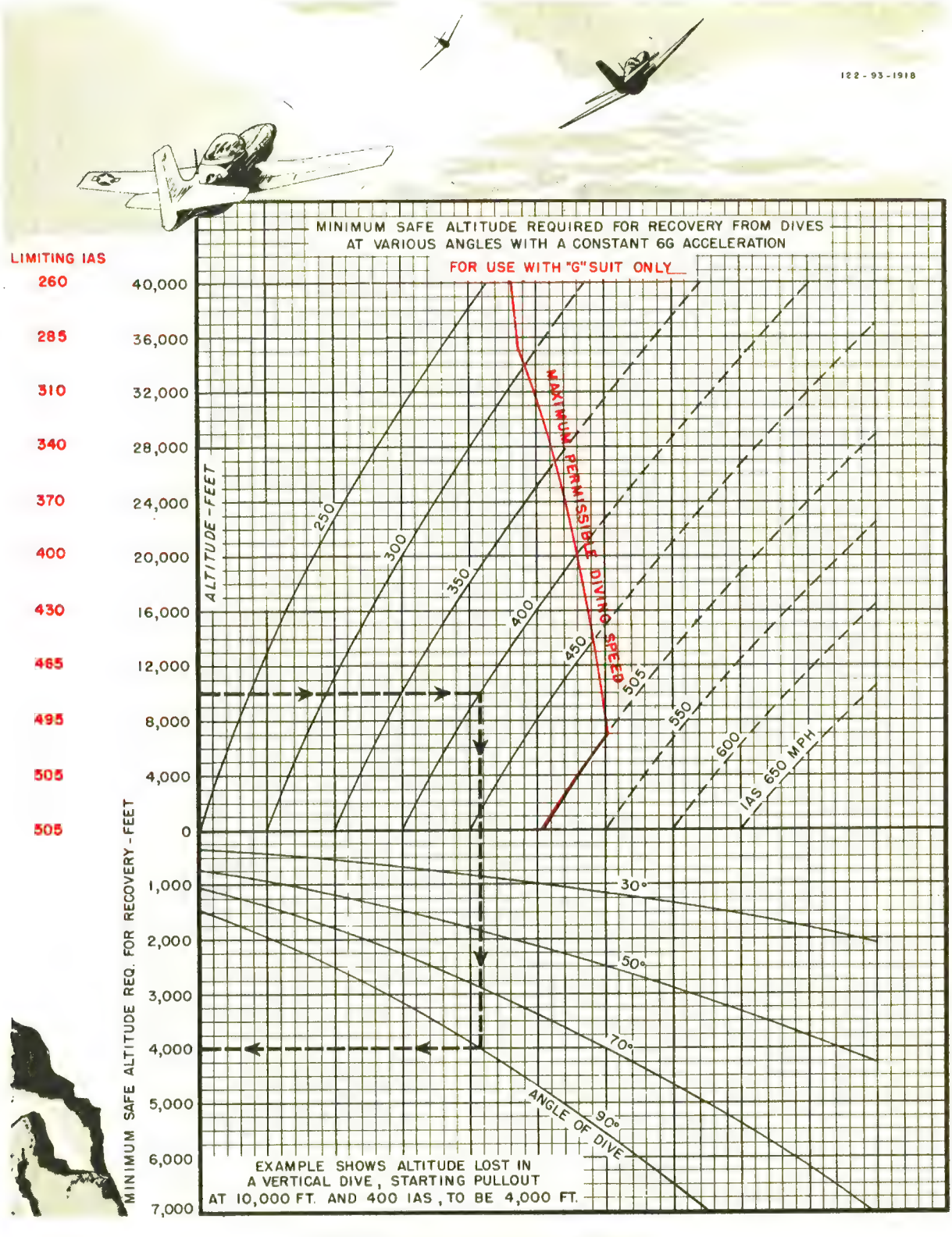


Figure 27—Diving Limitations—6G Pullout

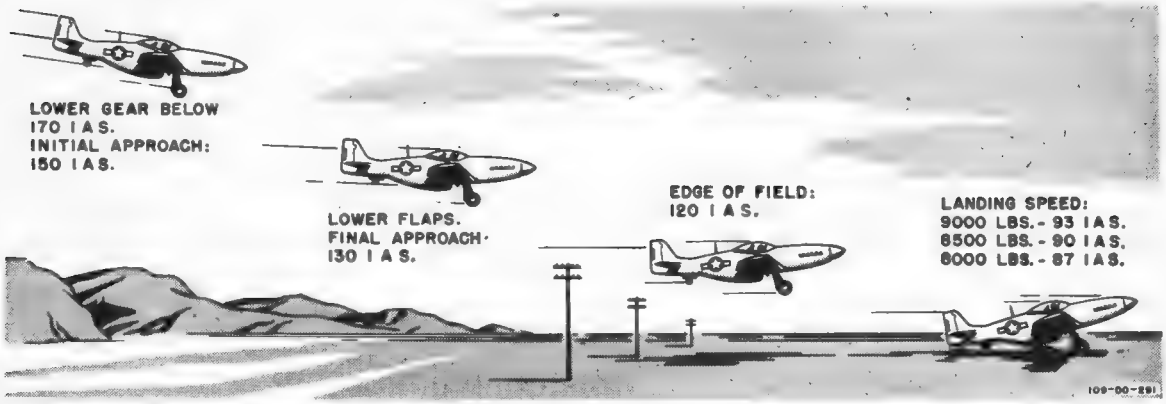


Figure 28—Approach and Landing Speeds

b. LANDING.

(1) GENERAL.—After you have turned into the field and lowered the flaps, maintain a correct gliding speed. Adjust the elevator trim tab to assist in landing. Having stopped after landing, raise the flaps before taxiing.

(2) CROSS-WIND LANDING.—As the airplane has a landing gear of wide tread and a steerable tail wheel, cross-wind landings may be negotiated safely. Keep one wing down, into the wind, to counteract drift.

(3) MINIMUM RUN LANDING.

(a) For a minimum run landing over an obstacle, lower the flaps fully and reduce power to obtain the lowest IAS consistent with safety.

(b) For a minimum run landing with no obstacle, use full flaps and make a flat, power-on approach.

(4) GO-AROUND PROCEDURE.—If an attempt to land is unsuccessful:

(a) Open throttle.

(b) Push propeller control to full "INCREASE RPM."

(c) Raise landing gear.

(d) When airspeed reaches 100 IAS, raise flaps.

22. STOPPING ENGINE.

a. Turn booster pump switch "OFF."

b. If a cold weather start is anticipated, hold oil dilution switch "ON" (3 minutes maximum).

c. Run engine to 1500 rpm, set mixture control in "IDLE CUT OFF," and move throttle fully open. Leave mixture control in "IDLE CUT OFF" as a precaution against accidental starting.

d. Turn ignition switch "OFF" after the engine ceases firing.

e. Turn fuel shut-off control "OFF."

23. BEFORE LEAVING COCKPIT.

a. Turn "OFF" all switches.

b. Release parking brakes after wheels are chocked.

c. Lock the control surfaces. (Use upper locking notch on control stick when airplane is to be towed.) *(See figure 7.)*

d. Place carburetor air control in "UNRAMMED FILTERED AIR" position.

e. Open canopy, and pull crank handle inboard to disengage clutch, so that canopy can be moved manually. *(See figure 10.)*

f. Close canopy after leaving cockpit.

1. AIRSPEED CORRECTION TABLES.

a. Two corrections must be made on the IAS in order to obtain the true indicated airspeed. The first correction is for the pitot installation; the second is for compressibility effects. Use the Airspeed Installation Correction Table to find the corrected indicated airspeed; then use the Compressibility Correction Table to obtain the true indicated airspeed.

b. EXAMPLE.

(1) PROBLEM.—Find true indicated airspeed from an IAS of 400 at 25,000 feet.

(2) ANSWER.—Corrected IAS = 400 + 4 (position error) or 404. True indicated airspeed = 404 less 19 or 385.

AIRSPEED INSTALLATION CORRECTION TABLE
(With or Without External Load)

FLAPS UP		FLAPS FULL DOWN	
IAS (mph)	CORRECTION	IAS (mph)	CORRECTION
100	Add 5 mph	90	Add 3 mph
150	Add 4 mph	100	Add 1 mph
200	Add 3 mph	110	Subtract 1 mph
250	Add 2 mph	120	Subtract 2 mph
300	Add 2 mph	130	Subtract 3 mph
350	Add 3 mph		
400	Add 4 mph		

COMPRESSIBILITY CORRECTION TABLE

Subtract From Corrected Indicated Airspeed

Pressure Altitude	IAS (mph)						
	150	200	250	300	350	400	500
10,000	0	1	2	3	4	6	10
15,000	0	1	3	4	7	10	17
20,000	1	2	4	6	10	14	25
25,000	1	3	5	9	13	19	33
30,000	2	4	7	12	19	25	42
35,000	2	5	10	16	25	33	53

POWER PLANT CHART

AIRCRAFT MODEL(S)	PROPELLER(S)	ENGINE MODEL(S)
P-51D AND P-51K	HAMILTON STANDARD	V-1650-7

GAUGE READING	FUEL PRESS.	OIL PRESS.	OIL TEMP.	COOLANT TEMP.	CARB. AIR TEMP.
DESIRED MAXIMUM	16-18 19	70-80	70-80 105	100-110 121	15-40 60
MINIMUM IDLING	16 9	50 15			

MAXIMUM PERMISSABLE DIVING RPM: 3240
MINIMUM RECOMMENDED CRUISE RPM: 1600

OIL GRADE: 1120, SPEC. NO. AN-O-8
FUEL GRADE: 100/130 SPEC. NO. AN-F-48
COOLANT: SPEC. NO. AN-E-2 WITH NaNBT

WAR EMERGENCY (COMBAT EMERGENCY)			MILITARY POWER (NON-COMBAT EMERGENCY)			OPERATING CONDITION			NORMAL RATED (MAXIMUM CONTINUOUS)			MAXIMUM CRUISE (NORMAL OPERATION)		
5 MINUTES			15 MINUTES			TIME LIMIT			UNLIMITED			UNLIMITED		
RUN 3000			RUN 3000			MIXTURE R. P. M.			RUN 2700			RUN 2400		
MANIF. PRESS.	SUPER-CHARGER	FUEL (2) Gal/Min	MANIF. PRESS.	SUPER-CHARGER	FUEL (2) Gal/Min	STD. TEMP. °C	PRESSURE ALTITUDE	STD. TEMP. °F	MANIF. PRESS.	SUPER-CHARGER	FUEL GPH (3)	MANIF. PRESS.	SUPER-CHARGER	FUEL GPH (3)
F.T.	HIGH	1.0	F.T.	HIGH	1.0	-55.0	40,000 FT.	-67.0	F.T.	HIGH	63	F.T.	HIGH	49
F.T.	HIGH	1.5	F.T.	HIGH	1.5	-55.0	38,000 FT.	-67.0	F.T.	HIGH	70	F.T.	HIGH	54
F.T.	HIGH	1.5	F.T.	HIGH	1.5	-55.0	36,000 FT.	-67.0	F.T.	HIGH	77	F.T.	HIGH	59
F.T.	HIGH	2.0	F.T.	HIGH	2.0	-52.4	34,000 FT.	-62.3	F.T.	HIGH	84	F.T.	HIGH	63
F.T.	HIGH	2.0	F.T.	HIGH	2.0	-48.4	32,000 FT.	-55.1	F.T.	HIGH	90	F.T.	HIGH	68
F.T.	HIGH	2.5	F.T.	HIGH	2.5	-44.4	30,000 FT.	-48.0	F.T.	HIGH	97	F.T.	HIGH	72
F.T.	HIGH	3.0	F.T.	HIGH	3.0	-40.5	28,000 FT.	-40.9	46	HIGH	101	F.T.	HIGH	77
F.T.	HIGH	3.5	61	HIGH	3.0	-36.5	26,000 FT.	-33.7	46	HIGH	99	F.T.	HIGH	82
67	HIGH	3.5	61	HIGH	3.0	-32.5	24,000 FT.	-26.5	46	HIGH	97	42	HIGH	84
67	HIGH	3.5	61	HIGH	3.0	-28.6	22,000 FT.	-19.4	46	HIGH	95	42	HIGH	83
67	HIGH	3.5	61	HIGH	3.0	-24.6	20,000 FT.	-12.3	F.T.	LOW	94	42	HIGH	82
67	HIGH	3.5	F.T.	LOW	2.5	-20.7	18,000 FT.	- 5.2	F.T.	LOW	100	42	HIGH	81
F.T.	LOW	3.5	F.T.	LOW	2.5	-16.7	16,000 FT.	2.0	46	LOW	105	F.T.	LOW	79
F.T.	LOW	3.5	F.T.	LOW	3.0	-12.7	14,000 FT.	9.1	46	LOW	102	42	LOW	84
F.T.	LOW	3.5	61	LOW	3.0	- 8.8	12,000 FT.	16.2	46	LOW	99	42	LOW	82
67	LOW	2.5	61	LOW	3.0	- 4.8	10,000 FT.	23.4	46	LOW	97	42	LOW	80
67	LOW	3.0	61	LOW	3.0	- 0.8	8,000 FT.	30.5	46	LOW	94	42	LOW	78
67	LOW	3.5	61	LOW	3.0	3.1	6,000 FT.	37.6	46	LOW	92	42	LOW	76
67	LOW	3.5	61	LOW	3.0	7.1	4,000 FT.	44.7	46	LOW	90	42	LOW	74
67	LOW	3.5	61	LOW	2.5	11.0	2,000 FT.	51.8	46	LOW	88	42	LOW	72
67	LOW	3.0	61	LOW	2.5	15.0	SEA LEVEL	59.0	46	LOW	86	42	LOW	70

GENERAL NOTES

(1) *Gal/Min:* APPROXIMATE U.S. GALLON PER *MINUTE* PER ENGINE
(3) GPH: APPROXIMATE U.S. GALLON PER HOUR PER ENGINE.
F.T.: MEANS FULL THROTTLE OPERATION.
VALUES ARE FOR LEVEL FLIGHT WITH RAM.

FOR COMPLETE CRUISING DATA SEE APPENDIX I
NOTE: TO DETERMINE CONSUMPTION IN BRITISH IMPERIAL UNITS, MULTIPLY BY 10 THEN DIVIDE BY 12.

TAKE-OFF CONDITIONS:
3000 RPM 61" MG

CONDITIONS TO AVOID:
OPERATION BELOW 1600 RPM LOW BLOWER
OPERATION BELOW 2000 RPM HIGH BLOWER

SPECIAL NOTES

**AVOID OPERATION BELOW 1600 RPM IN LOW BLOWER AS GENERATOR WILL NOT DELIVER SUFFICIENT AMPERAGE.*

**AVOID OPERATION BELOW 2000 RPM IN HIGH BLOWER BECAUSE OF ENGINE ROUGHNESS.*

AAFMC-526
8-1-44

DATA AS OF *8/20/44* BASED ON *FLIGHT TESTS*

Figure 29—Power Plant Chart—V-1650-7 Engine

POWER PLANT CHART

AIRCRAFT MODEL(S): P-51D AND K

PROPELLER(S): AEROPRODUCTS CONSTANT-SPEED OR HAMILTON STANDARD

ENGINE MODEL(S): V-1650-3

GAUGE READING	FUEL PRESS.	OIL PRESS.	OIL TEMP.	COOLANT TEMP.	CARB. AIR TEMP.
DESIRED MAXIMUM	16-18 18	70-80	70-80 105	100-110 121	15-40 50
MINIMUM IDLING	16 9	50 15			

MAXIMUM PERMISSIBLE DIVING RPM: 3240
MINIMUM RECOMMENDED CRUISE RPM: 1600

OIL GRADE: 1120, SPEC. NO. AN-O-8
FUEL GRADE: 100/130 SPEC. NO. AN-F-48
COOLANT: SPEC. NO. AN-E-2 WITH NaMBT

WAR EMERGENCY (COMBAT EMERGENCY)			MILITARY POWER (NON-COMBAT EMERGENCY)			OPERATING CONDITION			NORMAL RATED (MAXIMUM CONTINUOUS)			MAXIMUM CRUISE (NORMAL OPERATION)		
5 MINUTES			15 MINUTES			TIME LIMIT			UNLIMITED			UNLIMITED		
RUN 3000			RUN 3000			MIXTURE R. P. M.			RUN 2700			RUN 2400		
MANIF. PRESS.	SUPER-CHARGER	FUEL (2) Gal/Min	MANIF. PRESS.	SUPER-CHARGER	FUEL (2) Gal/Min	STD. TEMP. °C	PRESSURE ALTITUDE	STD. TEMP. °F	MANIF. PRESS.	SUPER-CHARGER	FUEL GPH (3)	MANIF. PRESS.	SUPER-CHARGER	FUEL GPH (3)
F.T.	HIGH	2.0	F.T.	HIGH	2.0	-55.0	40,000 FT.	-67.0	F.T.	HIGH	63	F.T.	HIGH	48
F.T.	HIGH	2.0	F.T.	HIGH	2.0	-55.0	38,000 FT.	-67.0	F.T.	HIGH	74	F.T.	HIGH	56
F.T.	HIGH	2.0	F.T.	HIGH	2.0	-55.0	36,000 FT.	-67.0	F.T.	HIGH	85	F.T.	HIGH	64
F.T.	HIGH	2.5	F.T.	HIGH	2.5	-52.4	34,000 FT.	-62.3	F.T.	HIGH	96	F.T.	HIGH	70
F.T.	HIGH	2.5	F.T.	HIGH	2.5	-48.4	32,000 FT.	-55.1	46	HIGH	102	F.T.	HIGH	77
F.T.	HIGH	2.5	61	HIGH	2.5	-44.4	30,000 FT.	-48.0	46	HIGH	100	F.T.	HIGH	84
67	HIGH	3.0	61	HIGH	2.5	-40.5	28,000 FT.	-40.9	46	HIGH	98	42	HIGH	86
67	HIGH	3.0	61	HIGH	2.5	-36.5	26,000 FT.	-33.7	46	HIGH	97	42	HIGH	84
67	HIGH	3.0	F.T.	LOW	2.5	-32.5	24,000 FT.	-26.5	F.T.	LOW	99	F.T.	LOW	71
F.T.	LOW	2.5	F.T.	LOW	2.5	-28.6	22,000 FT.	-19.4	F.T.	LOW	111	F.T.	LOW	76
F.T.	LOW	2.5	F.T.	LOW	2.5	-24.6	20,000 FT.	-12.3	46	LOW	119	F.T.	LOW	83
F.T.	LOW	3.0	61	LOW	3.0	-20.7	18,000 FT.	- 5.2	46	LOW	117	F.T.	LOW	91
67	LOW	3.0	61	LOW	3.0	-16.7	16,000 FT.	2.0	46	LOW	116	42	LOW	94
67	LOW	3.0	61	LOW	3.0	-12.7	14,000 FT.	9.1	46	LOW	114	42	LOW	93
67	LOW	3.0	61	LOW	3.0	- 8.8	12,000 FT.	16.2	46	LOW	112	42	LOW	92
67	LOW	3.0	61	LOW	3.0	- 4.8	10,000 FT.	23.4	46	LOW	110	42	LOW	90
67	LOW	3.0	61	LOW	2.5	- 0.8	8,000 FT.	30.5	46	LOW	109	42	LOW	88
67	LOW	3.0	61	LOW	2.5	3.1	6,000 FT.	37.6	46	LOW	107	42	LOW	86
67	LOW	3.0	61	LOW	2.5	7.1	4,000 FT.	44.7	46	LOW	105	42	LOW	85
67	LOW	3.0	61	LOW	2.5	11.0	2,000 FT.	51.8	46	LOW	103	42	LOW	83
67	LOW	3.0	61	LOW	2.5	15.0	SEA LEVEL	59.0	46	LOW	101	42	LOW	81

GENERAL NOTES

(1) Gal/Min: APPROXIMATE U.S. GALLON PER MINUTE PER ENGINE
(3) GPH: APPROXIMATE U.S. GALLON PER HOUR PER ENGINE.
F.T.: MEANS FULL THROTTLE OPERATION.
VALUES ARE FOR LEVEL FLIGHT WITH RAM.

FOR COMPLETE CRUISING DATA SEE APPENDIX I
NOTE: TO DETERMINE CONSUMPTION IN BRITISH IMPERIAL UNITS, MULTIPLY BY 10 THEN DIVIDE BY 12. RED FIGURES ARE PRELIMINARY SUBJECT TO REVISION AFTER FLIGHT CHECK.

TAKE-OFF CONDITIONS:
3000 RPM 61 IN. HG

*CONDITIONS TO AVOID:
OPERATIONS BELOW 1600 RPM LOW BLOWER
OPERATIONS BELOW 2000 RPM HIGH BLOWER

SPECIAL NOTES

**AVOID OPERATION BELOW 1600 RPM IN LOW BLOWER AS GENERATOR WILL NOT DELIVER SUFFICIENT AMPERAGE.*

**AVOID OPERATION BELOW 2000 RPM IN HIGH BLOWER BECAUSE OF ENGINE ROUGHNESS.*

AAFMC-526 X-1-44

DATA AS OF *5-8-45* BASED ON *FLIGHT TESTS*

Figure 30—Power Plant Chart—V-1650-3 Engine

1. GENERAL.

All emergency instructions, except those contained in section II, have been assembled in this section to facilitate quick reference. Thoroughly acquaint yourself with these instructions before flying this airplane.

2. ENGINE FAILURE DURING TAKE-OFF.

Follow instructions in section II, paragraph 10.

3. ENGINE FAILURE DURING FLIGHT.

a. If the engine fails during flight, the airplane may be abandoned, ditched *(paragraph 6)*, or brought in for a dead-stick landing. For a landing with the engine dead, follow these instructions:

(1) Depress the nose at once so that the airspeed does not drop below stalling speed. Keep IAS well above stalling speed.

(2) If external tanks or bombs are installed, release them immediately. *(See paragraph 9.)*

(3) Turn "OFF" fuel shut-off control and battery-disconnect switch.

(4) Choose an area for landing. If near a landing field, notify tower. Judge your turns carefully and plan to land into the wind.

(5) Release sliding canopy by pulling emergency release handle on right longeron.

WARNING

Before emergency release of canopy in flight, drop seat and lower head as far as possible. If excessive force was used in securing canopy prior to take-off, it may be necessary to crank the canopy back enough to relieve the pressure against the windshield before the emergency release will be effective.

(6) If a long runway is available and if there is sufficient time and altitude to properly plan an approach, lower the landing gear. *If landing under any other condition, keep the gear up;* you will stand less chance of injury by making a belly landing.

(7) Lower the flaps approximately 30 degrees, saving the last 20 degrees of flap to overcome possible mistakes in judgment. Lower flaps fully when proper landing is assured.

(8) Land into the wind, changing direction only as necessary to miss obstructions.

(9) After landing, get out of the airplane as quickly as possible and remain outside.

4. RUNAWAY PROPELLER.

a. Failure of the governor to operate properly may result in a runaway propeller. A runaway propeller goes to full low pitch and may result in an engine rpm as high as 3600 or more. When such a failure occurs, the only method of reducing the rpm is to pull the throttle back and decrease airspeed. In doing this, it is highly important to make use of the allowable maximum overspeed (diving) rpm of 3240, given on the Power Plant Charts, and to reduce the IAS to approximately 140 mph in order to obtain the maximum horsepower available. The following procedure is recommended:

(1) Pull throttle back to obtain 3240 rpm.

(2) Raise nose of airplane to lose speed, and then return to sea level altitude. Keep IAS at approximately 140 mph.

(3) When over landing field, lower gear and come in at normal landing speed indicated in figure 28.

5. EMERGENCY EXIT DURING FLIGHT.

a. If an emergency exit must be made during flight, the following procedures are recommended:

(1) Unfasten safety belt and shoulder harness, and disconnect headphones and oxygen tube. Release sliding canopy by pulling emergency release handle on right longeron; then roll airplane over on its back and drop out.

WARNING

Before emergency release of canopy in flight, drop seat and lower head as far as possible. If excessive force was used in securing canopy prior to take-off, it may be necessary to crank the canopy back enough to relieve the pressure against the windshield before the emergency release will be effective.

(2) If possible, reduce speed and trim airplane to fly "hands off." (Trim to descend at 500 feet per minute.) Then proceed as follows:

(a) Unfasten safety belt and shoulder harness, and disconnect headphones and oxygen tube.

CAUTION

If jump is made at high altitude, remain connected to the regular airplane oxygen supply while all other preparations for leaving the airplane are made. Just before leaving the airplane, disconnect the oxygen mask from the mask-to-regulator tubing and place the type H-2 emergency bail-out oxygen cylinder in operation by pulling the rip-cord cable of the oxygen cylinder (the caution tag and pin assembly having been removed prior to take-off).

(b) Release sliding canopy.

(c) Raise seat to topmost position.

(d) Rise to a crouched position in seat, placing left foot on seat and right foot on right longeron adjacent to armor plate. Grasp armor plate with right hand and right longeron with left hand. *(See figure 31.)*

(e) Kick with legs and push with hands at instant of leaving cockpit, and dive for the right wing tip.

Note

The right side is recommended because the slipstream will help you clear the airplane. If this method is used, the wing will either pass your body before contact, or it will be possible to slide off the wing, and you will not strike the empennage.

6. DITCHING.

a. The airplane should be ditched *only as a last resort.* If, on an overwater flight, trouble arises and you are quite certain that you will not be able to reach land, leave the airplane while in flight. However, if it is not possible to maintain sufficient altitude for a successful parachute drop, ditching is the only remaining procedure. The instructions for ditching are as follows *(figure 32.)*:

(1) If bombs or droppable tanks are installed, release them immediately.

(2) Release sliding canopy. (See "WARNING" note in paragraph 5. *a.* (1).)

(3) Be sure your shoulder harness and safety belt are fastened securely as there is a violent deceleration of the airplane upon final impact.

(4) Land into the wind with flaps half down and landing gear up. Approach with one wing low (about 20 degrees) and speed just enough above stalling to maintain lateral control. Kick hard inside rudder just as the low wing tip hits the water, so as to spin the airplane around on the surface. This is known as "landing with a swerve" and although it is a difficult maneuver, it prevents the severe diving and extremely high deceleration that always result when a straight landing is made. As soon as the airplane comes to rest, get out *immediately.*

WARNING

Get out quickly upon landing. After the final impact, the airplane will sink very rapidly, *only remaining above the surface of the water for a period of 1½ to 2 seconds.*

7. LANDING GEAR EMERGENCY LOWERING.

In the event of hydraulic system failure, the landing gear may be lowered by placing the landing gear control handle in the "DOWN" position and yawing sideways. However, if the red landing gear warning light illuminates or horn sounds when the throttle is retarded (indicating an unsafe condition), pull the fairing door emergency knob, located just forward of the control stick, and then yaw the airplane sideways to force the gear into the locked position. If the tail wheel does not lock, increase the airplane's speed to increase the air load on the partially extended wheel, or dive the airplane a short distance and pull out with enough acceleration to down the tail wheel.

8. COOLANT RADIATOR FLAP EMERGENCY CONTROL.

If, under any condition of flight, an excessive coolant temperature persists, first try the manual "OPEN" position of the electrical control switch. If, after approximately 20 to 30 seconds, the temperature remains high and failure of the coolant flap actuator is indicated, pull the emergency release lever at the right side of the seat. One quick pull up will open the flap to a minimum of 7 inches.

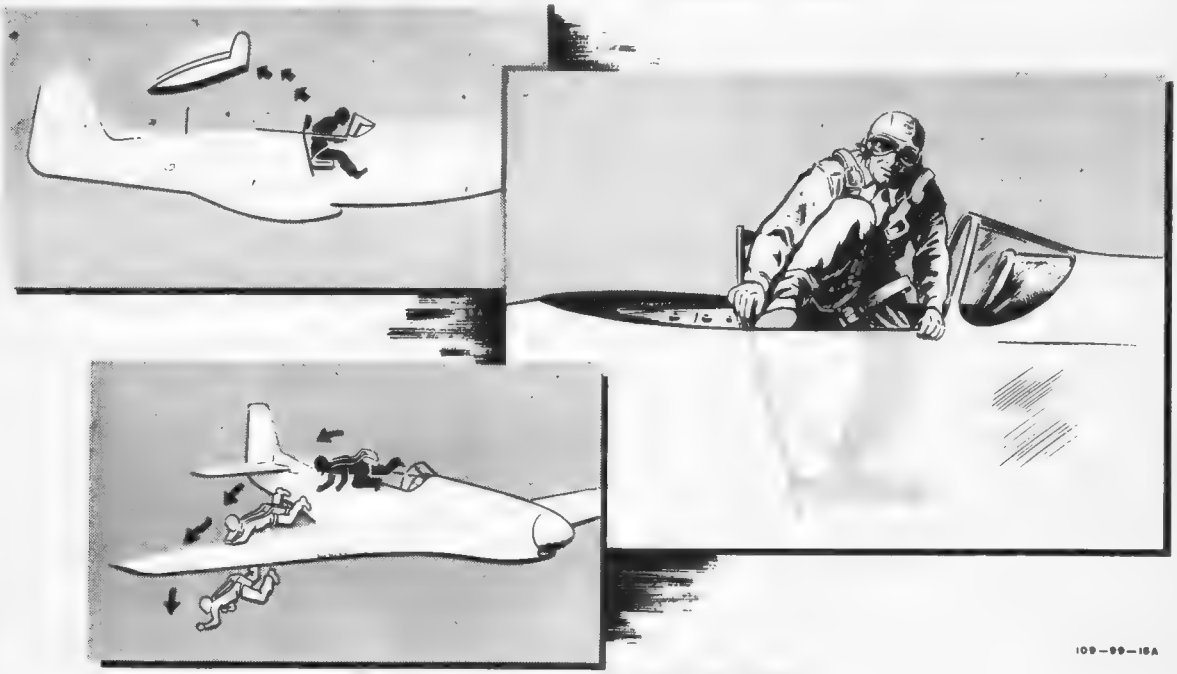


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Figure 31—Emergency Exit During Flight

109—00—276A

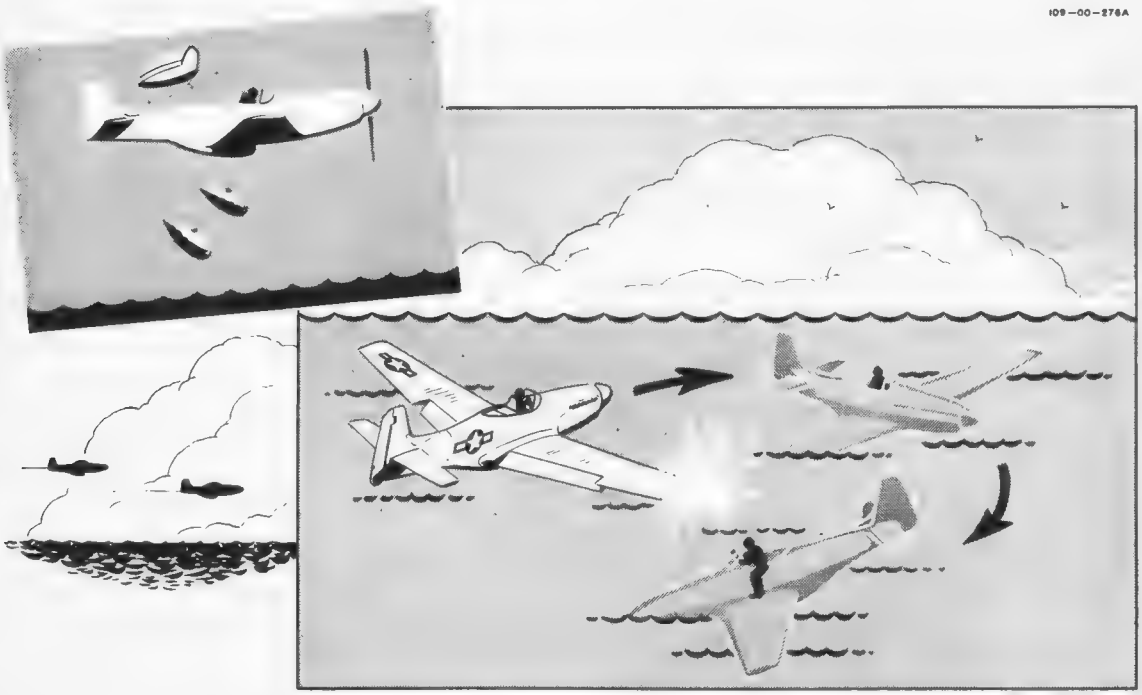


Figure 32—Ditching Airplane

The emergency control will extend the flap approximately 5½ inches beyond the flap setting at the time of release; therefore, if the high coolant temperature was not caused by actuator failure, an undesirable cooling condition may result from use of the emergency control. To check this possibility, after using the emergency release, hold the electrical control switch in the closed position for approximately 20 seconds. This will ensure that the flap is not extended beyond 7 inches if the electrical actuator is functioning at all. Then turn the switch to "OFF" for the remainder of the flight.

When the emergency release has been used, low power operation should be avoided to prevent the coolant temperature from going below the minimum allowable as a result of the greater flap opening. There is no provision for emergency closing of the flap, nor can the emergency release be reset in flight.

CAUTION

Use the emergency release with discretion. High coolant temperatures may be the result of high power settings, low altitude flight, engine malfunction, or a broken indicator rather than actuator failure.

9. EMERGENCY RELEASE OF BOMBS OR DROPPABLE FUEL TANKS.

The bombs or droppable fuel tanks are released by pulling out on both emergency bomb release handles at left side of instrument panel.

10. EMERGENCY USE OF OXYGEN.

If for any reason there is a lack of oxygen, immediately turn "ON" the red emergency knob on the oxygen regulator. If a flow of pure oxygen is not received, place the type H-2 emergency bail-out oxygen cylinder in operation by pulling the rip-cord cable on the oxygen cylinder and reduce altitude to 20,000 feet or less within a time interval of 10 minutes or less.

11. USE OF MISCELLANEOUS EMERGENCY EQUIPMENT.

a. RADIO DEMOLITION SWITCH.—This switch, on the right side of the cockpit, controls a charge for demolishing the identification radio in an emergency. If identification set is installed, press both buttons simultaneously to set off the charge.

b. FIRST-AID KIT.—The contents of the first-aid kit are to be used only in an emergency, when medical aid is not available. Use contents of kit in accordance with the directions contained therein.

c. LIFE PRESERVER.—The back cushion on the seat is filled with kapok and may be used as a life preserver.

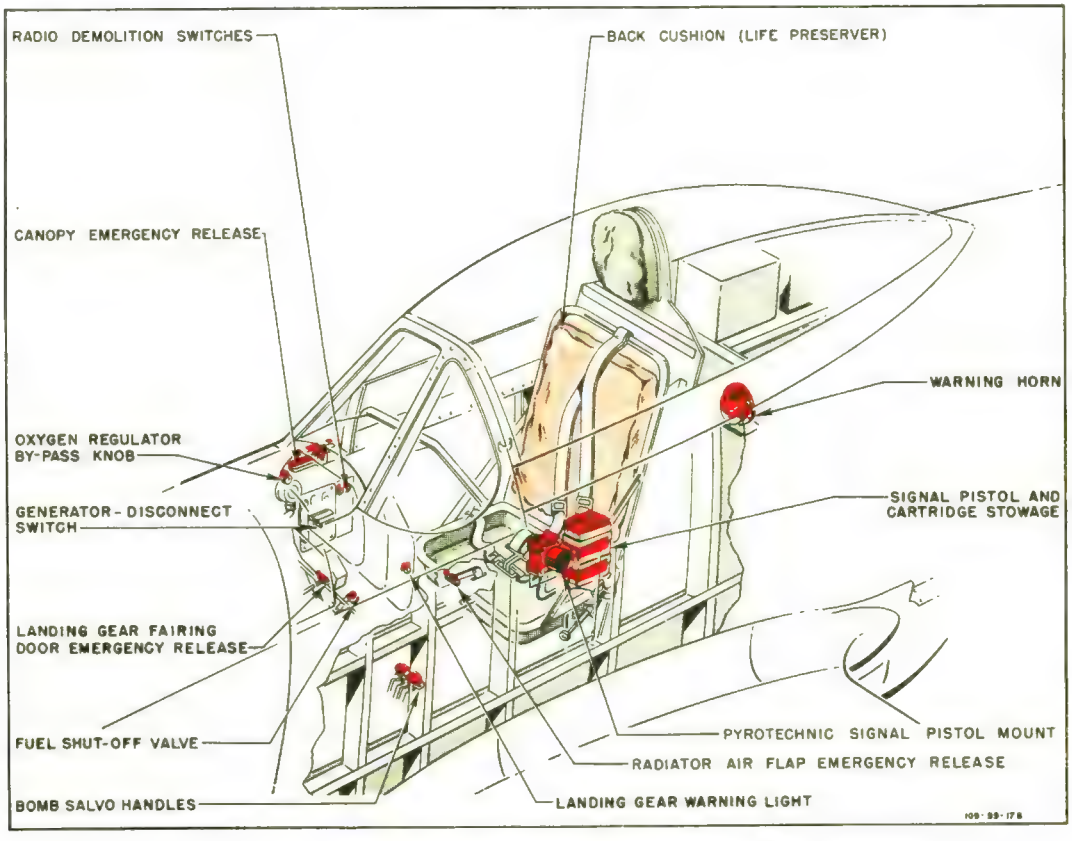


Figure 33—Emergency Equipment

1. GUNNERY EQUIPMENT.

a. GENERAL.

(1) DESCRIPTION.—Either of two gun installations may be used: a maximum of three fixed .50-caliber guns in each wing, or an alternate load of two guns in each wing. The maximum load includes 400 rounds of ammunition for each inboard gun and 270 rounds for each center and outboard gun. When the alternate installation is used, the center guns are removed, and 500 rounds of ammunition are provided for each outboard gun. Airplanes with the zero rail rocket installation have a K-14A or K-14B compensating gun sight. Other airplanes have a Type N-9 gun sight, the rheostat for which is on the front switch panel. Spare gun sight lamps are in clips on the underside of the instrument shroud. A gun sight aiming point camera with an overrun control is in the leading edge of the left wing. Late airplanes have a Type B-6 gun and bomb control switch assembly.

CAUTION

Keep gun sight in operation at all times when engine is running to prevent damage to gyro.

(2) OPERATION.

(a) On missions requiring gun heat, turn "ON" gun heater switch immediately after starting engine.

(b) Turn gun and camera safety switch to "CAMERA AND SIGHT." On K-14A gun sight, turn gyro motor "ON-OFF" switch on selector dimmer control to "ON." On the K-14B gun sight, the "ON-OFF" switch has been eliminated, and the gyro motor is turned on when the battery-disconnect switch is moved to "ON."

(c) Move selector switch on selector-dimmer control to "GYRO" or "FIXED AND GYRO."

(d) On combat missions, turn gun and camera safety switch to "GUNS, SIGHT, AND CAMERA" as soon as the airplane is safely off the ground.

(e) To operate gun sight, turn on rheostat located on selector-dimmer control. (The gun sight will not operate until the gun and camera switch has been turned on.)

(f) Fire guns by squeezing trigger on control stick grip. When camera only is required, turn gun safety switch to "SIGHT AND CAMERA" and squeeze trigger.

Note

When the gun and camera safety switch is on, the heaters in the camera will function automatically at low temperature.

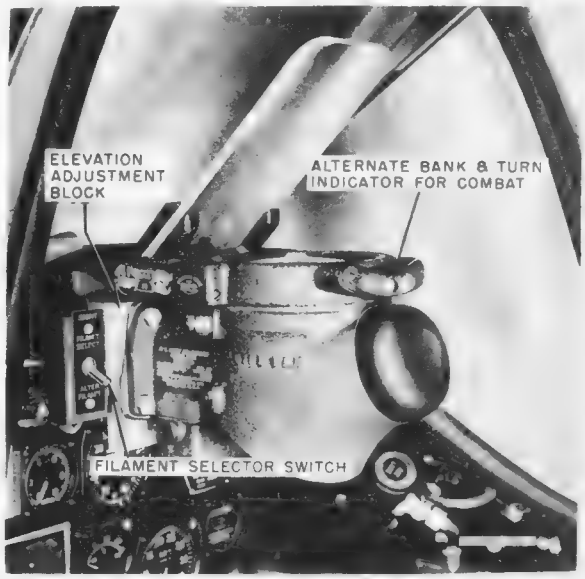
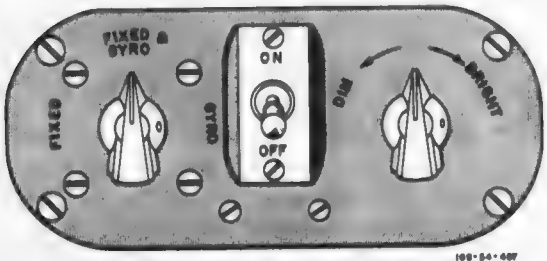


Figure 34—Type N-9 Gun Sight



SELECTOR-DIMMER CONTROL PANEL

Figure 35—K-14A Gun Sight Installation

(e) Before landing, make sure that the gun and camera safety switch is at "CAMERA AND SIGHT" and gun heater switch is "OFF."

b. K-14A OR K-14B COMPENSATING GUN SIGHT.

(1) DESCRIPTION.—The K-14A or K-14B sight compensates the correct lead angle for target crossing speed at ranges of from 200 to 800 yards. The sight contains two optical systems, fixed and gyro. The fixed optical system projects on the reflector glass a cross surrounded by a 70-mil ring. The 70-mil ring can be blanked out by means of the lever on the left of the sight. Normally blanked out, the ring is used only in case of mechanical failure of the gyro or for ground strafing. The gyro optical system projects on the reflector glass a circle of six diamonds surrounding a central dot. The diameter of the circle is varied by changing the setting of the span scale lever on the face of the sight or by rotating the throttle twist grip. The selector-dimmer control panel is under the right side of the instrument shroud.

(2) TESTING THE GUN SIGHT.

(a) While on the ground, turn gun-camera safety switch to "CAMERA AND SIGHT." On K-14A gun sight, turn gyro motor "ON-OFF" switch to "ON"; on K-14B gun sight, make sure battery-disconnect switch is "ON." Rotate dimmer rheostat until correct reticle brilliance is obtained.

(b) Set selector to "FIXED AND GYRO." Both the fixed and gyro reticles will appear on the reflector. If the 70-mil ring appears, blank it out with lever at left of sight.

(c) Make sure dot of the gyro is superimposed on the fixed cross. This is done by switching selector switch back and forth from "FIXED AND GYRO" to "GYRO."

(d) Take off and fly in a circle at a constant rate of turn. Rotate the twist grip on the throttle slowly and note that, with the sight set for long range (small diameter gyro reticle), the gyro reticle lags farther behind the fixed cross than when the sight is set for short range (large diameter reticle).

(3) COMBAT OPERATION OF GUN SIGHT.

(a) Identify your opponent; then set the span scale to correspond with the enemy type.

(b) Fly your airplane so that the enemy appears within the gyro reticle, and rotate the throttle twist grip until the diameter of the gyro reticle corresponds to the size of the enemy.

(c) Continue to rotate throttle twist grip, keeping the enemy within the gyro reticle—then fire!

(4) OPERATIONAL NOTES.

(a) Turn sight on before take-off, and leave on until landing, whenever the presence of the enemy is possible.

(b) When not using the sight and when maneuvering into position for attack, ***keep the sight set at shortest range*** (large diameter gyro reticle) and decrease the diameter to correspond to the enemy's size.

(c) ***Track the target before firing.*** Continually frame the target, by operating the twist grip, while tracking for a minimum period of one second; then fire. The gyro sight compensates correctly *only* after the target has been correctly framed and tracked for a minimum period of one second.

(d) Learn to use the sight in place of your flight instruments. Note that, with the selector set for normal operation (fixed and gyro), the relative positions of the fixed and gyro reticles indicate what your airplane is doing. If the cross and dot are superimposed, you are flying in a straight line.

(e) For firing at a stationary ground target, use the fixed part of the sight.

2. ZERO RAIL ROCKETS.

a. DESCRIPTION.—Late airplanes are equipped to carry 10 zero rail rockets, each of which is attached to two pods on the underside of the wings. If bombs or droppable fuel tanks are installed, only six rockets may be carried. The armament switches are located on the front switch panel *(figure 37)*, and the gun sight rheostat is on a bracket, just to the right of the gun sight.

b. OPERATION.

(1) Turn "ROCKET TO BE FIRED" dial to "1". *(See figure 37.)*

(2) Place bomb-rocket selector switch in "ROCKETS" position.

Note

When this switch is in "ROCKETS," the bomb release circuits are inoperative.

(3) To nose arm rockets for an instant delay upon impact, turn arming switch to "DELAY."

Figure 36—Gun and Bomb Control Switches—Type B-6

(4) To fire rockets one at a time, turn rocket release control switch to "SINGLE" and press bomb release button on control stick, once for each rocket.

Note

Rockets on airplanes with the MX-241-4 rocket tube modification cannot be fired simultaneously with the machine guns. An electrical interrupter has been placed in the gun firing circuit which will cut out the machine guns if the gun trigger and the rocket firing button are operated simultaneously. However, if the rocket switch on the intervalometer is "OFF," the firing circuit interrupter will not function.

(5) To fire all rockets in train, turn control switch to "AUTO" and press bomb release button for approximately one second.

Note

The firing order of the rockets singly or in train is as follows:

LEFT WING		RIGHT WING
1 3 5 7 9	INBOARD	10 8 6 4 2

(Rockets 7, 8, 9, and 10 are not installed when bombs are installed.)

3. BOMBING EQUIPMENT.

a. DESCRIPTION.—An external, removable bomb rack may be installed under each wing. Each rack will hold one 100, 250, or 500-pound bomb. Chemical tanks or combat fuel tanks may be carried on the bomb racks when bombs are not installed. The tanks are released either by normal or salvo operation of the bomb control system. Two bomb salvo handles provide a selective mechanical release of bombs or tanks. The bomb system electrical controls consist of a

Figure 37—Front Switch Panel—Airplanes With Zero Rail Rocket Installation

bomb release switch on top of the control stick, and three bomb arming switches and a bomb release selector switch. *(See figures 37 and 39.)*

CAUTION

As neither the wing nor the bomb racks were designed for 1000-pound bombs, it is not recommended that they be installed. If this installation is necessary to accomplish particular missions, the airplane should be held to straight and level flight until the bombs are released.

b. OPERATION.

(1) GENERAL.—The electrical release of bombs is the normal release. The "SALVO" release is used only if the electrical release fails. The two "NOSE ARM" switches arm the nose fuse of the bombs on the left and right racks. The

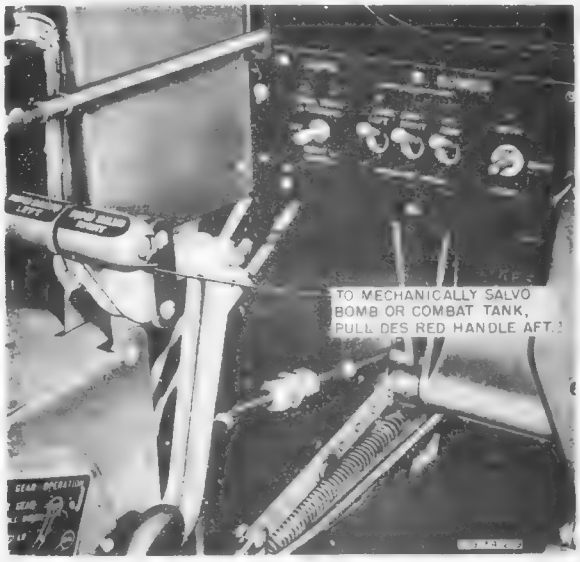


Figure 38—Bomb Controls—Early Airplanes

"TAIL ARM" switch arms the bomb tail fuse on both racks. The bomb release selector switch has the following positions: "BOTH," "SAFE," and "TRAIN."

Note

On early airplanes the selector switch "TRAIN" position is marked "SELECTIVE."

With the selector switch on "BOTH," the bombs will be released simultaneously when the release switch is pressed. When the selector switch is on "TRAIN" and the bomb release switch is pressed, the left bomb will be released; when the bomb release switch is pressed again, the right bomb will be released. The bomb release circuit is inoperative when the selector switch is in the "SAFE" position.

Note

Bombs may be released when the airplane is in any attitude of flight from a 30-degree climb to a vertical dive.

(2) INOPERATIVE POSITION OF CONTROLS.—When the controls are not in use, position them as follows:

(a) Bomb release selector switch in "SAFE."

(b) Nose and tail arming switches "OFF."

(3) TRAIN RELEASE (Electrical).

(a) Place arming switches in desired position.

(b) Place bomb release selector switch on "TRAIN" ("SELECTIVE" on early airplanes).

(c) Press bomb release switch button momentarily to release bomb on left rack.

(d) Press bomb release button again to release bomb on right bomb rack.

(e) Bomb arming switches "OFF," bomb release selector switch to "SAFE."

(4) SIMULTANEOUS RELEASE (Electrical).

(a) Place bomb arming switches in desired position.

(b) Place bomb release selector switch on "BOTH."

(c) Press bomb release switch; both bombs will release.

(d) Bomb arming switches "OFF," bomb release selector switch to "SAFE."

Note

For emergency bomb release, pull back on both bomb salvo handles at left side of instrument panel.

(5) OPERATION OF CHEMICAL TANKS.

(a) On early airplanes, turn "ON" left and right-hand nose arming switches; then turn switches "OFF" when smoke appears.

Figure 39—Armament Switch Panel—Late Airplanes

(b) On late airplanes, lift nose arming switches to "CHEM. RELEASE" (momentary position) and release switches when smoke appears.

4. COMMUNICATION EQUIPMENT.

a. GENERAL.—Various combinations of the following seven radio sets may be installed in these airplanes: the SCR-522-A, SCR-274-N, or AN/ARC-3 (late airplanes) command equipment; the SCR-695-A or the SCR-515 identification equipment; the AN/ARA-8 homing adapter; and the AN/APS-13 tail-warning radar equipment. On early airplanes equipped with a fuselage tank the command radio equipment only may be installed; however, both command and identification equipment may be installed if the fuselage tank is removed. On late airplanes which have the battery located forward of the firewall, the IFF SCR-695-A radio may be installed in addition to the SCR-522-A (or AN/-ARC-3) and AN/APS-13 equipment. *(See figure 43.)* A Model 438 Detrola or BC-1206-A, B, or C receiver may be installed in conjunction with the SCR-522-A. Additional communication equipment includes a signal pistol, a signal lamp, and recognition lights.

b. COMMAND SET SCR-522-A.

(1) DESCRIPTION.—This set is a push-button controlled transmitter-receiver, operating on the 100 to 156 mc band. The control box is just aft of the right-hand switch panel in the cockpit. A transmit-receive button is on the throttle lever. On some airplanes a remote contactor is installed on the left side of the instrument panel. The contactor switches the transmitter from the "A," "B," or "C" band to the "D" band for 14 seconds of every minute. The pointer on the face of the contactor indicates when the switching action will take place. Normally, the clock switch on the contactor should not be touched in flight; it is set on the ground by the service crew.

(2) OPERATION.

Note

The "[illegible]-REM" switch has been lockwired in the "REM" position.

(a) To receive or transmit on channel "A," "B," "C," or "D," press corresponding channel selector button on control box. Tubes will require approximately 30 seconds to warm. Adjust headset volume with volume control on junction box and monitor the station to be contacted. On airplanes equipped with a remote contactor, check operation with switch in "OUT" and "IN" positions. Press throttle "press-to-talk" button and speak in a normal tone. To receive, release pressure on throttle button.

Note

Indicator lamp glare is controlled by the dimmer mask lever on the control box. The lamps behind the four green jewels indicate the channel in operation. The lamp behind the white jewel opposite the "T-R-REM" switch glows when the equipment is in the receive position.

(b) To turn set off, press "OFF" button on control box.

c. RANGE RECEIVER (Detrola Model 438 or BC-1206-A, B, or C).

(1) DESCRIPTION.—This receiver covers a frequency range of 200-400 kc and is mounted on the floor at the right side of the cockpit.

(2) OPERATION.

(a) Turn hexagonal control knob clockwise to turn set on and to increase volume. Tune in desired station with "tuning knob."

(b) Turn hexagonal control knob fully counterclockwise to turn the receiver off.

d. COMMAND SET SCR-274-N.

(1) DESCRIPTION.

(a) GENERAL.—This set consists of two transmitters and three receivers with independent controls for each group, and an antenna switching relay. The control boxes are mounted at the right side of the cockpit.

(b) TRANSMITTER.—The transmitter control box contains three switches, marked "TRANS POWER," "TRANSMITTER SELECTOR," and "TONE-CW-VOICE." The switch marked "TRANSMITTER SELECTOR" has four divisions, two of which are used. Markings on the "TONE-CW-VOICE" switch indicate the type of signal being transmitted. With the switch turned to the "TONE" position, a signal is transmitted which is practically 100 percent modulated at 1000 cycles. With the switch turned to the "CW" position, a "continuous wave" or unmodulated signal will be transmitted. With the switch turned to the "VOICE" position, the microphone will be operative and voice will be transmitted when the push-to-talk button is pressed. For long-range communication, "CW" is most effective, "TONE" next, and "VOICE" least effective. The microphone is inoperative on both the "CW" and "TONE" positions, and code signals may be transmitted by a key on top of the transmitter control box. If desired, a separate key may be plugged into the jack marked "KEY."

(c) RECEIVER.—The receiver control box is divided into three sections. A signal of specific frequency is received by using the section of the receiver control box which controls the particular receiver involved.

(2) OPERATION.

(a) TRANSMISSION.—Switch "ON" transmitter power switch, select one of the two transmitters, and turn "TONE-CW-VOICE" switch to the desired position.

(b) RECEPTION.—Turn on switch in upper right-hand corner of the control box section used. This switch, in addition to having an "OFF" position, has two selective positions marked "CW" and "MCW," each of which is an on position and indicates the type of signal to be received. To increase the volume of the signal, turn the knob on the lower left corner of the control section in a clockwise direction.

e. COMMAND SET AN/ARC-3.

(1) DESCRIPTION.—The AN/ARC-3 set consists of a transmitter and receiver, a power supply and a control box. This equipment provides remote operation on eight frequency channels for airplane-to-airplane and airplane-to-ground communication. The control box is located on the radio control panel at the right side of the cockpit with eight red channel-selector buttons on the box designated by letters "A" through "H." A volume control, also on the panel, controls the audio output of the set.

(2) OPERATION.

(a) Push any one of the eight channel selector buttons on the control box and allow approximately 30 seconds for the set to warm up.

(b) To stop the operation of the equipment, depress the "OFF" button and the small metal locking button, located forward of the channel-selector buttons, at the same time.

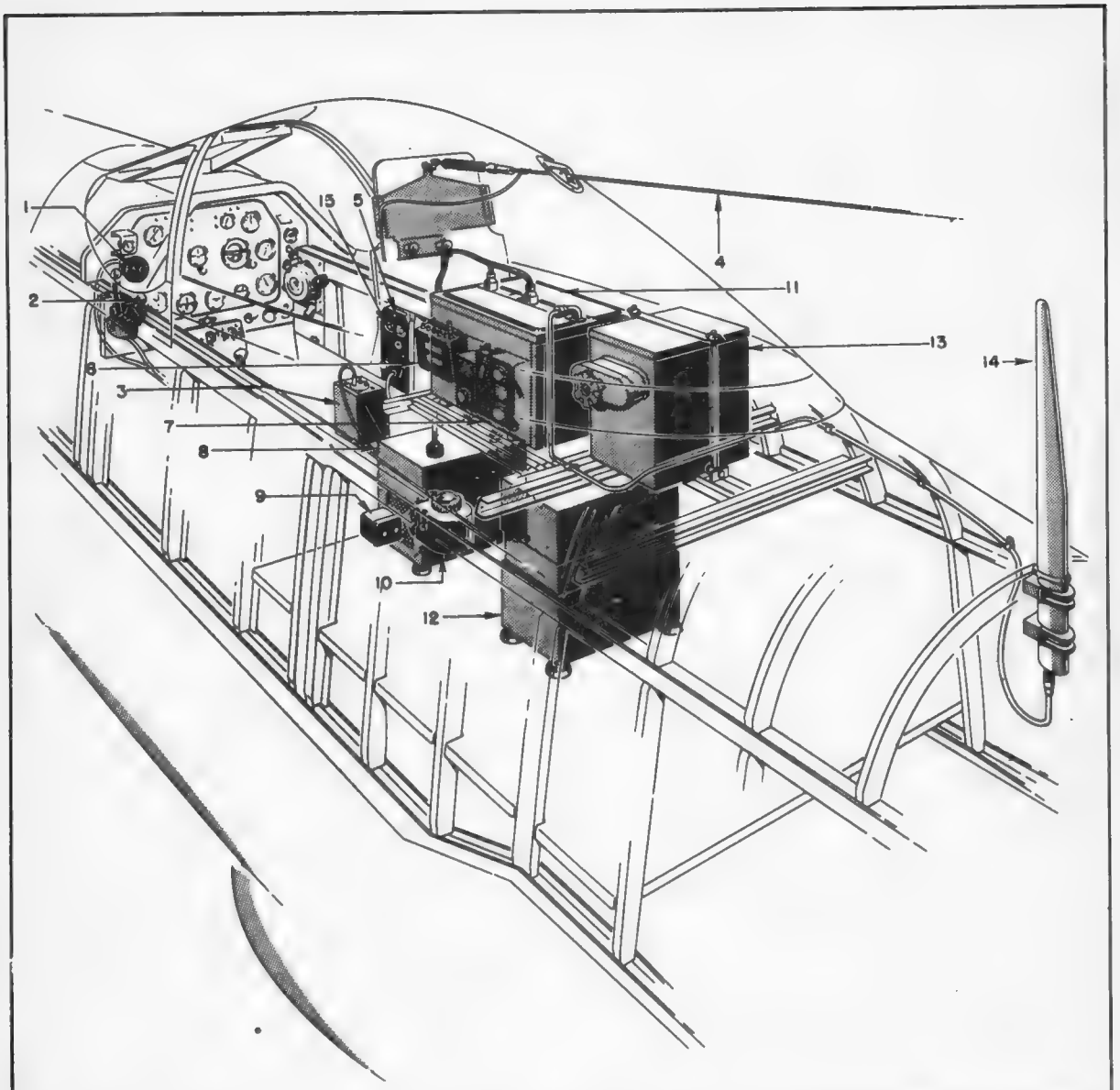
f. RADAR EQUIPMENT AN/APS-13.

(1) DESCRIPTION.—The radar equipment visibly and audibly warns the pilot of the approach of other aircraft from behind within a designated angle of protection. Controls for operating the equipment are located on the radio control panel at the right side of the cockpit.

(2) OPERATION.

(a) Move "ON-OFF" toggle switch to the "ON" position. After warming up for approximately 3 minutes the warning indicator light should illuminate and the warning bell should sound. The light and bell should always function whenever the equipment is operated on the ground and until the airplane reaches an altitude of approximately 3000 feet.

(b) To check the equipment during flight, move "TEST" switch to "ON" position, and hold. If indicator illuminates and warning bell rings, the set is functioning properly. Let the "TEST" switch drop to its normal position.



1. REMOTE CONTACTOR
2. THROTTLE SWITCH
3. DETROLA RECEIVER MODEL 438
4. DETROLA & SCR-274-N ANTENNA
5. 106-71154 PANEL ASSEMBLY
6. CONTROL BOX FOR SCR-522-A
7. CONTROL BOX FOR SCR-695-A
8. DYNAMOTOR FOR SCR-522-A
9. INDICATOR LAMPS SCR-695-A
10. INERTIA SWITCH SCR-695-A
11. TRANSMITTER RECEIVER SCR-522-A
12. RADIO SET SCR-695-A
13. BATTERY
14. ANTENNA FOR SCR-522-A
15. SCR-695-A DETONATOR BUTTONS

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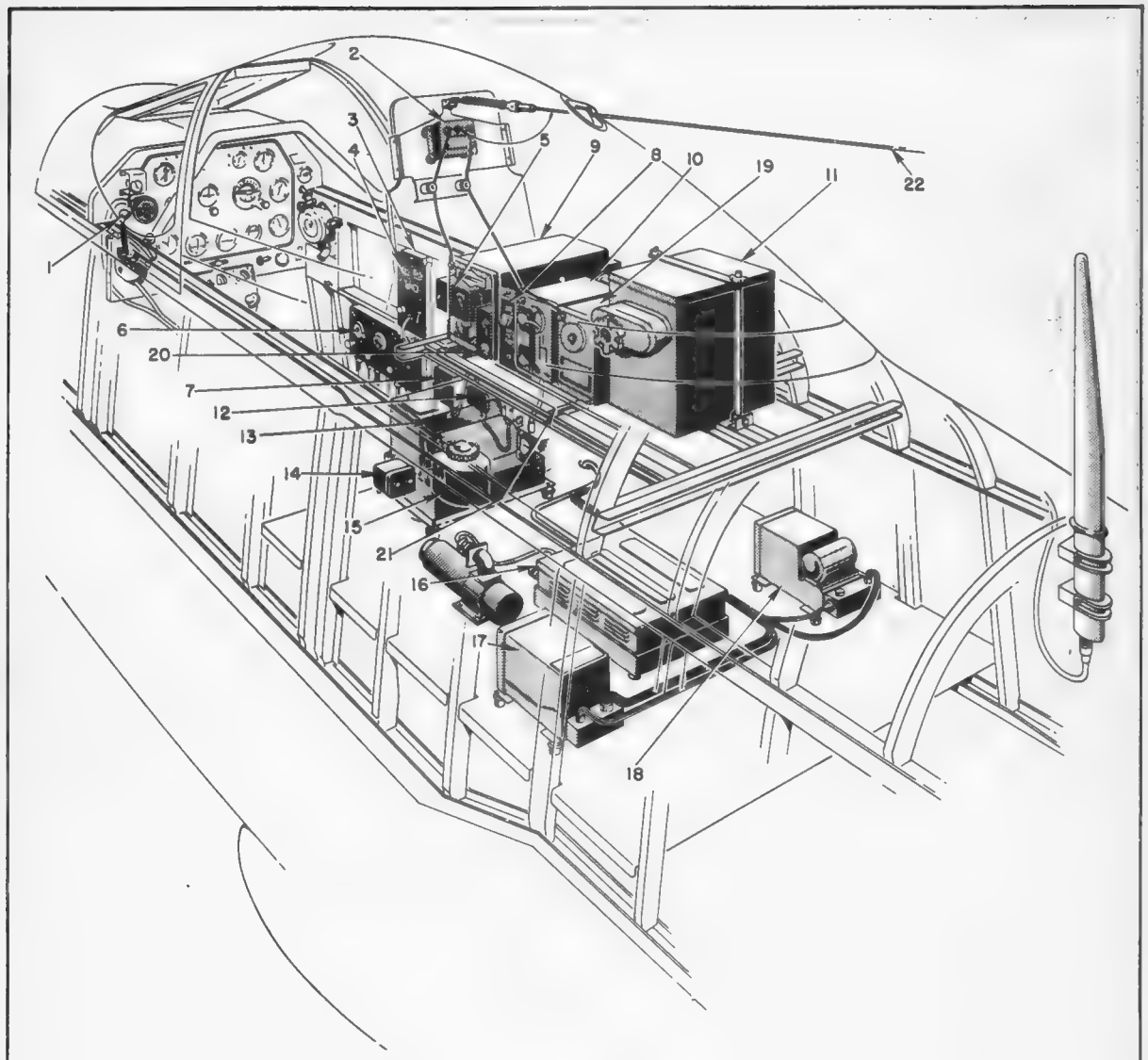
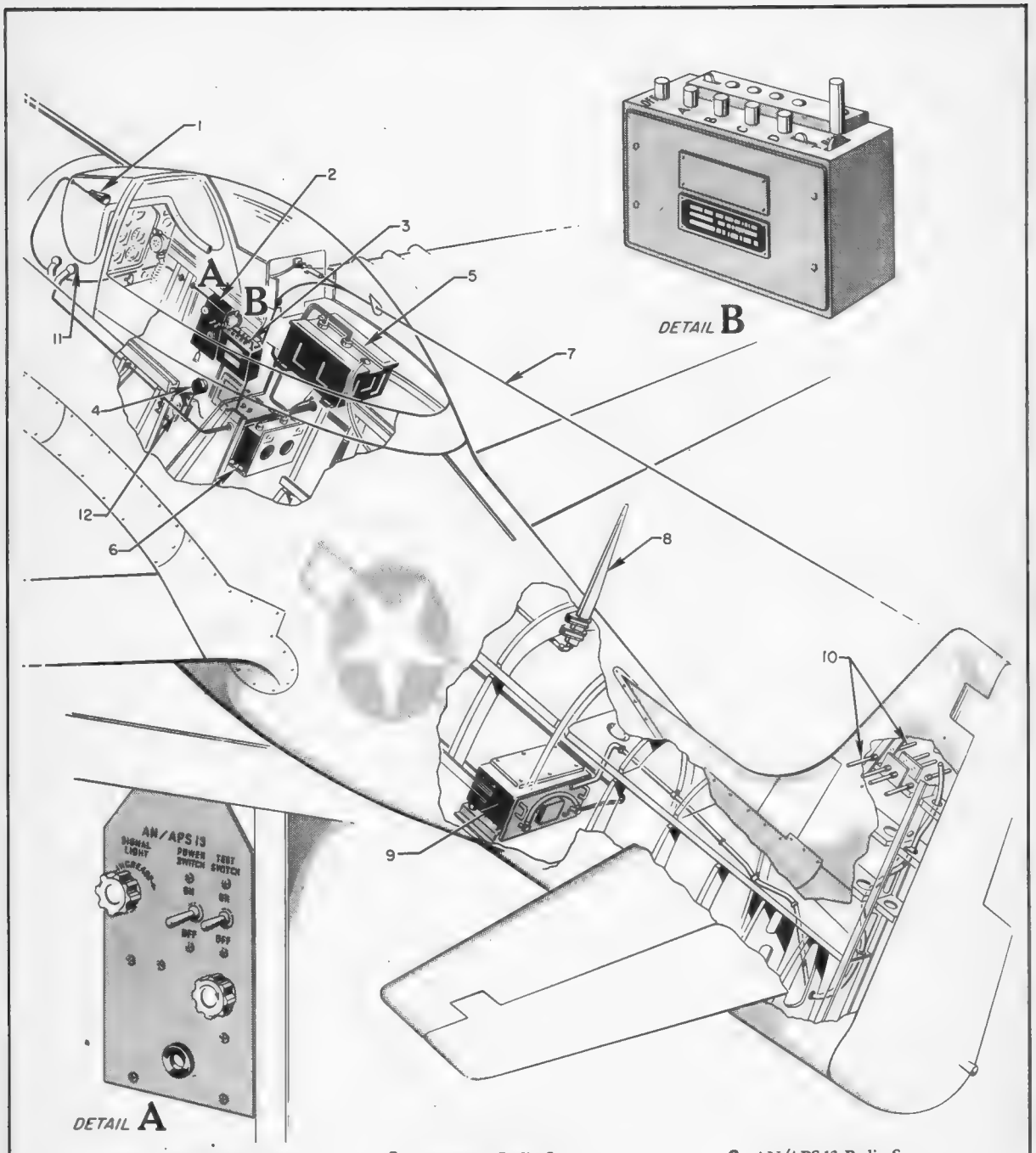
Figure 40—SCR-522-A and SCR-695-A Radio Equipment—Early Airplanes



1. THROTTLE SWITCH
2. BC-442 ANTENNA RELAY
3. 106-71154 PANEL ASSEMBLY
4. SCR-515-A DETONATOR BUTTONS
5. BC-451-A TRANSMITTER CONTROL BOX
6. BC-450-A RECEIVER CONTROL BOX
7. FL-8 FILTER BOX
8. SCR-515-A CONTROL BOX
9. BC-457 TRANSMITTER
10. BC-453 RECEIVER
11. BATTERY
12. MC-385 MICROPHONE ADAPTOR
13. BC-456 MODULATOR UNIT
14. INDICATOR LIGHTS SCR-515
15. INERTIA SWITCH SCR-515
16. SCR-515-A RADIO SET
17. BC-458 TRANSMITTER
18. BC-455 RECEIVER
19. BC-454 RECEIVER
20. 106-71131 CHANNEL SUPPORT
21. 109-71132 CHANNEL SUPPORT
22. SCR-274-N ANTENNA

109-71-65J

Figure 41—SCR-274-N and SCR-515 Radio Equipment—Early Airplanes



1. AN/APS-13 Radio Signal Light
2. AN/APS-13 Control Panel
3. SCR-522-A Radio Control Panel
4. AN/APS-13 Radio Signal Bell
5. SCR-522-A Radio Set
6. Dynamotor for SCR-522-A Radio
7. Radio Range Receiver Antenna
8. Mast for SCR-522-A Radio Set
9. AN/APS-13 Radio Set
10. Antenna Array for AN/APS-13
11. Throttle Switch
12. Radio Range Receiver

Figure 42—SCR-522-A and AN/APS-13 Radio Equipment—Late Airplanes

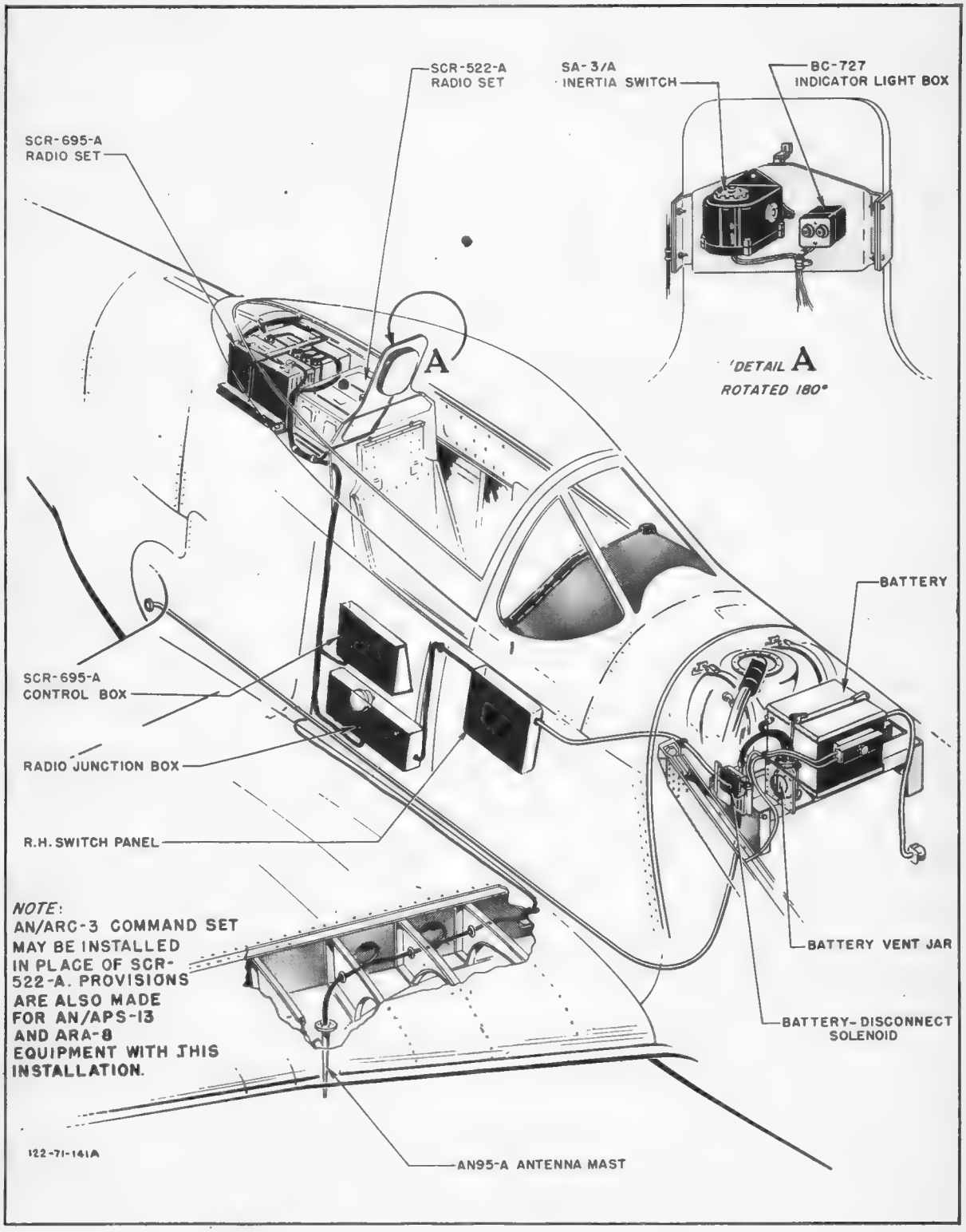


Figure 43—SCR-695-A and SCR-522-A Radio Equipment—Late Airplanes

g. HOMING ADAPTER AN/ARA-8.
(Late Airplanes).

(1) DESCRIPTION.—This adapter unit is used in conjunction with the AN/ARC-3 VHF equipment to permit homing on any transmitted carrier within the frequency range of 120 to 140 megacycles. In addition, this equipment may be used for air-to-air homing for purposes of rendezvous. Homing can be accomplished on CW, MCW, and audio pulse signals. Controls are provided above the VHF control box at the right side of the cockpit.

(2) OPERATION.

(a) To start operation of the equipment, move the "HOMING-COMM-TRANS" switch to the "HOMING" position.

(b) To stop operation of the equipment, move the "HOMING-COMM-TRANS" switch to the "COMM" position.

h. IDENTIFICATION EQUIPMENT.—The identification equipment is controlled from a box aft of the right-hand switch panel. For operating instructions, see the communications officer in charge. Detonator buttons and an inertia crash switch are provided with this equipment.

WARNING

Insert destructor plug only when the airplane is ready to take off. Remove plug immediately after landing.

i. PYROTECHNIC RECOGNITION SIGNAL PISTOL.

(1) DESCRIPTION.—An M-8 pyrotechnic pistol is stowed in a canvas holster strapped to the pistol cartridge stowage bag to the left of the seat. A pistol mount is next to the stowage bag. A cap, chained to the mount, covers the port when the pistol is not installed.

(2) OPERATION.

(a) Remove cover cap from mount.

(b) Insert muzzle of pistol in the mount so that the lugs on the pistol barrel slip into the slots; then, while depressing the mount release trigger, turn the pistol to right or left as far as it will go.

(c) To load pistol, press breech lock lever (behind the mount release trigger) and apply force on the butt until the breech opens. Then insert signal into the chamber and close breech. Pistol is cocked automatically when breech is closed.

WARNING

Do not load pistol except when it is in the mount, as no safety is provided.

j. SIGNAL LAMP.—On early airplanes, a Type AN3089 signal lamp may be stowed in a bracket on the left side of the cockpit floor. An electrical receptacle for the lamp is located behind the pilot's seat on the right side. Colored filters may be used with the lamp.

k. RECOGNITION LIGHTS.—For operation of recognition lights, see section II, paragraph 20. *a.* (5).

5. OXYGEN SYSTEM.

a. DESCRIPTION.—Oxygen is supplied from two Type D-2 and two Type F-2 low-pressure oxygen cylinders. See figure 45 for location of units. A Type A-14 mask is used with this equipment. The blinker flow indicator operates with the breathing of the wearer, indicating proper functioning of the system. The oxygen cylinders may be refilled without removal from the airplane by means of a filler valve located on the lower left side of the fuselage. Normal full pressure of the system is 400 pounds per square inch.

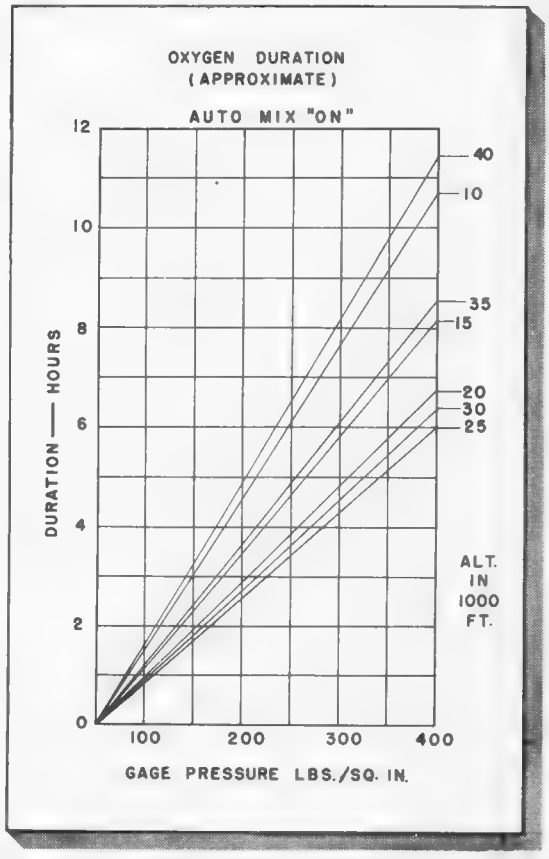
b. OPERATION.

(1) PREFLIGHT CHECK.

(a) See that mask is properly fitting and check for leakage by holding the thumb over the corrugated hose fitting and inhaling normally. See that mask is clean.

(b) Check mask fitting to see that gasket is in place; then insert fitting into end of tubing from regulator. Be sure the fit is snug and that a pull of at least 10 pounds is required to separate the two.

(c) Inspect mask regulator tubing for damage. Make sure all clamps are firmly in place.



THREE TYPE F-2 CYL'S

Figure 44—Oxygen Consumption Chart

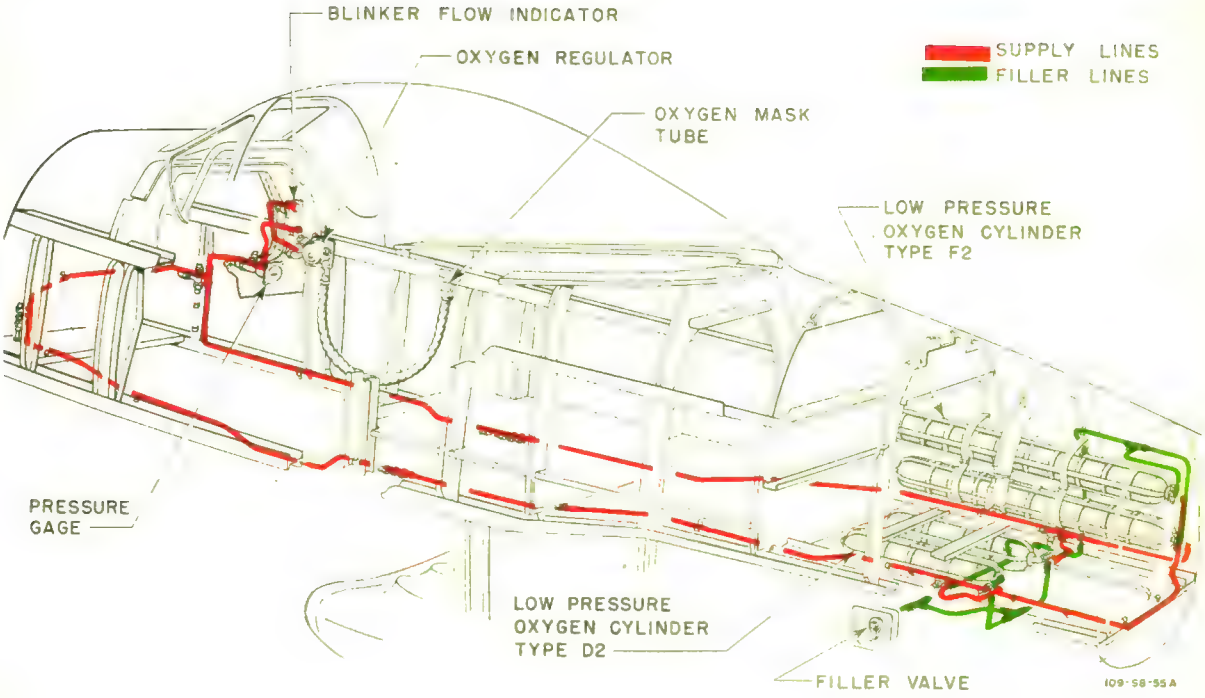


Figure 45—Oxygen System

(d) Attach the spring clip on the tubing to the clothing or parachute harness high up on the chest. It may be desirable to sew a tab of fabric or webbing to the clothing to accommodate the clip. Be sure that the attachment is high enough so that there is free movement of the head without kinking the mask hose.

(e) Make certain the knurled collar at the outlet end of the regulator is tight. Examine top diaphragm to see that it is not ruptured or distorted.

(f) Turn emergency knob "ON" to check the flow. Check the pressure gage to see that there is no perceptible pressure drop. Turn emergency knob "OFF" and ascertain that it does not leak. Leave it in this position.

(g) Turn the auto-mix to "OFF." Note on flow indicator that upon inhalation, the top diaphragm goes down and that nearly 100 percent oxygen is received. Turn the auto-mix to "ON" and note that there is little or no indication of oxygen flow on the indicator. Leave auto-mix in this position.

(h) Check pressure of the system. It must not be less than 400 pounds per square inch. Before take-off, make certain that the pressure gage shows sufficient oxygen supply for the mission.

(2) DURING FLIGHT.

(a) If necessary, manipulate the mask at regular intervals to free it from ice.

(b) Be sure hose does not become kinked or twisted.

(c) If an insufficient amount of oxygen is being supplied, turn red emergency knob on regulator to "ON."

(d) Check pressure gage and flow indicator frequently.

(e) In any flight over 30,000 feet, pay particular attention to oxygen equipment. Be sure all units and instruments are functioning perfectly before attempting flight to extremely high altitudes. Any failure of the equipment may be fatal.

(3) AFTER FLIGHT.

(a) Be sure all oxygen equipment is in proper condition before leaving airplane. If any difficulties have developed during flight, take necessary steps to have them corrected.

(b) Wash mask with mild soap and water, dry thoroughly, and leave in a clean airy place out of the sunlight.

Note

The oxygen mask will not stand abuse. See that the mask is properly stored or hung up in the airplane when not in use. Exposure of the mask to sunlight causes rapid deterioration.

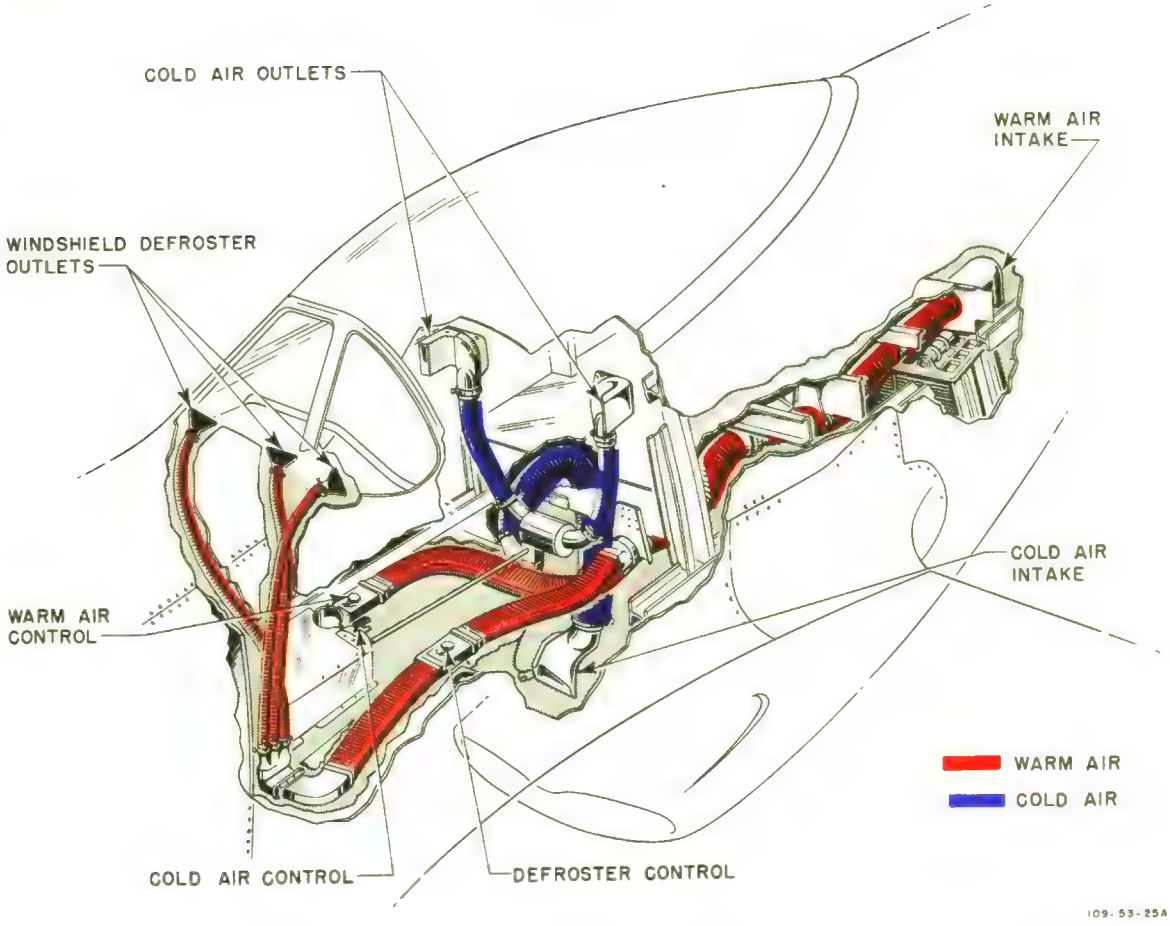


Figure 46—Heating, Ventilating, and Defrosting System

6. HEATING, VENTILATING, AND DEFROSTING SYSTEM.

a. COCKPIT HEATING AND DEFROSTING.—Warm air from aft of the coolant radiator is utilized to heat the cockpit and to defrost the front and left windshield panels. *(See figure 46.)* The cockpit hot air control is on the floor at the right of the control column; the defroster control is on the floor at the left of the control column. To admit warm air, turn desired control to the right, toward "ON."

b. COCKPIT VENTILATION.—Air from the forward section of the radiator air scoop is used to cool the cockpit. The cold air control is on the floor at the right side of the seat. Cold air outlets are located behind the seat.

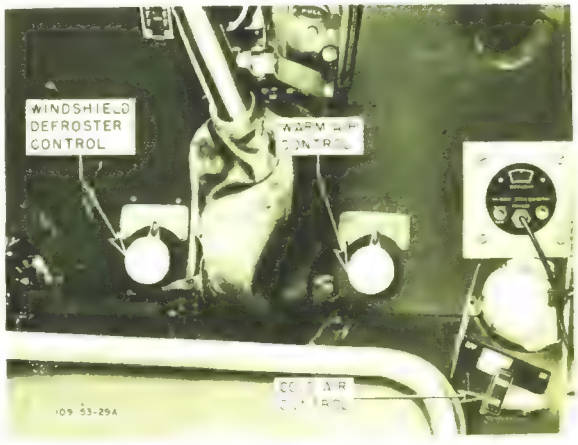


Figure 47—Heating, Ventilating, and Defrosting Controls

1. WINTER OPERATION.

a. DESCRIPTION.

(1) GENERAL.—The primary extreme weather provisions on the airplane are for winterization. These installations are described in the following paragraphs, with instructions for their use in the sequence they will be needed.

(2) OIL DILUTION SYSTEM.

(a) Operate engines at 1000 to 1200 rpm.

(b) Maintain oil temperature below 50°C and oil pressure above 15 pounds per square inch.

(c) Dilute as follows: 4° to −12°C (40° to 10°F) 3 minutes maximum.

(d) For temperatures below −12°C (10°F) it will be necessary to drain the oil system and refill with warm oil before flight.

(3) SURGE PROTECTION.—The self-thawing oil cooler is equipped with a surge protection valve for cold weather starting. The oil cooler exit flap is fully closing.

(4) CARBURETOR ICING PROTECTION.

(a) A carburetor ice guard screen is installed in the carburetor air intake duct. Should this screen ice over, a spring-loaded door will open automatically to admit air from the engine section to the carburetor.

(b) Blank doors, supplied as loose equipment, may be installed over the filtered air intakes on each side of the engine cowling in place of the perforated doors. When these doors are installed, engine compartment air will enter the induction system whenever the carburetor cold air control is placed in the "UNRAMMED FILTERED AIR" position. On late airplanes, movement of the hot air control to "HOT" will ensure that a maximum amount of heated air is entering the carburetor.

(5) CARBURETOR AIR TEMPERATURE GAGE.—The carburetor air temperature gage is mounted on the lower left corner of the instrument panel.

(6) WING, ENGINE, AND PROPELLER COVERS.—The airplane is provided with an engine and a cockpit cover. Wing and propeller covers will be furnished by the AAF.

(7) GUN HEATERS.—The electrical gun heaters are controlled by a switch on the right switch panel.

(8) COOLANT RADIATOR EXIT FLAP.—A spring-loaded baffle in the exit flap makes the flap fully closing. *(See figure 48.)* When not installed, the baffle is stowed in the airplane as loose equipment.

b. OPERATION.

(1) STARTING ENGINE.—A normal start should be made by following the procedure outlined in section II. The following supplementary instructions are to be followed if any difficulty is encountered when starting the engine.

(a) Preheat the engine and the instrument panel before attempting to start the engine. In extremely cold weather, it may be necessary to preheat the oil and coolant before starting.

Note

If the outside air temperature is −23°C (−10°F) or colder, an engine start without the use of ground heating facilities should not be attempted. Excessive priming and numerous unsuccessful attempts to start without the use of ground heat are detrimental to the engine and accessories.

(b) Use a portable generator instead of the conventional battery cart for starting the engine, as batteries quickly lose their charge at below freezing temperatures.

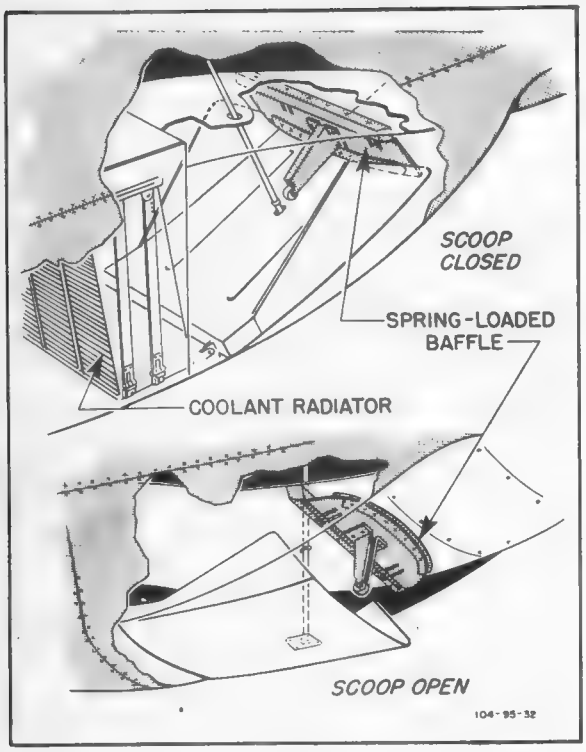


Figure 48—Coolant Radiator Outlet Duct Baffle

(c) Pull propeller through 5 or 6 revolutions by hand before engaging starter.

(d) When sub-zero weather makes starting difficult, move the mixture control from "IDLE CUT OFF" to "AUTO RICH" or "RUN" at the same time the starter is engaged with the engine. However, it is essential that the mixture control be moved back to the "IDLE CUT OFF" position if the engine does not start before the fourth revolution. Normally, the engine will start on the second or third revolution. However, if the engine does not start, turn "OFF" the ignition switch and pull the engine through by hand with the throttle fully opened to clear the engine of excess fuel.

(e) If the engine fails to start, moisture on the spark plugs may be the cause. Remove at least one plug from each cylinder and dry the points. Make another attempt to start the engine after replacing the plugs.

(f) Start the engine normally, without regard to the oil dilution system. After starting engine, if a heavy viscous oil is indicated by oil pressure that is too high, or by oil pressure that fluctuates or falls back when the engine rpm is increased, the dilution switch may be pushed "ON" (3 minutes maximum) to dilute the oil and correct this condition. This method should be used only if time and extreme temperature conditions do not permit normal engine warm-up.

CAUTION

When it is not known to what percentage the oil has been diluted, it is necessary to drain and refill the oil system before flight.

(g) Do not run the engine at more than 1300 rpm until the oil has reached a temperature of 15°C.

Note

If blank doors are installed on the filtered air intakes, engine warm-up may be facilitated by moving carburetor air control to "UNRAMMED FILTERED AIR." On late airplanes, move hot air control to "HOT."

(2) TAKE-OFF.

(a) Do not take off with snow, ice or frost on the wings. Even loose snow cannot be depended upon to blow off, and even a thin frost layer can cause loss of lift and very treacherous stalling characteristics. Since frost formation can be very rapid, it may be necessary to taxi out to the take-off position before removing the protective covers from the flight surfaces.

Note

When the outside air temperature is 0°C (32°F) or lower, it is advisable to use carburetor heat during take-off to improve vaporization of fuel.

(b) When taking off or landing on a narrow strip of clear ice, cross winds are particularly dangerous because of poor maneuverability caused by lack of traction. If the wind is gusty, the airplane may be blown completely off the ice before control can be regained.

(3) FLIGHT.

(a) After taking off from snow or slush-covered fields, operate the landing gear and flaps through several cycles to prevent them from freezing in the up position.

(b) Turn "ON" the pitot tube heater switch. This switch should not be "ON" with the airplane on the ground, as there is insufficient cooling in the pitot head to prevent overheating.

(c) When icing of the carburetor is indicated by irregular engine operation, and the airplane has blank doors over the filtered air intakes, move carburetor cold air control

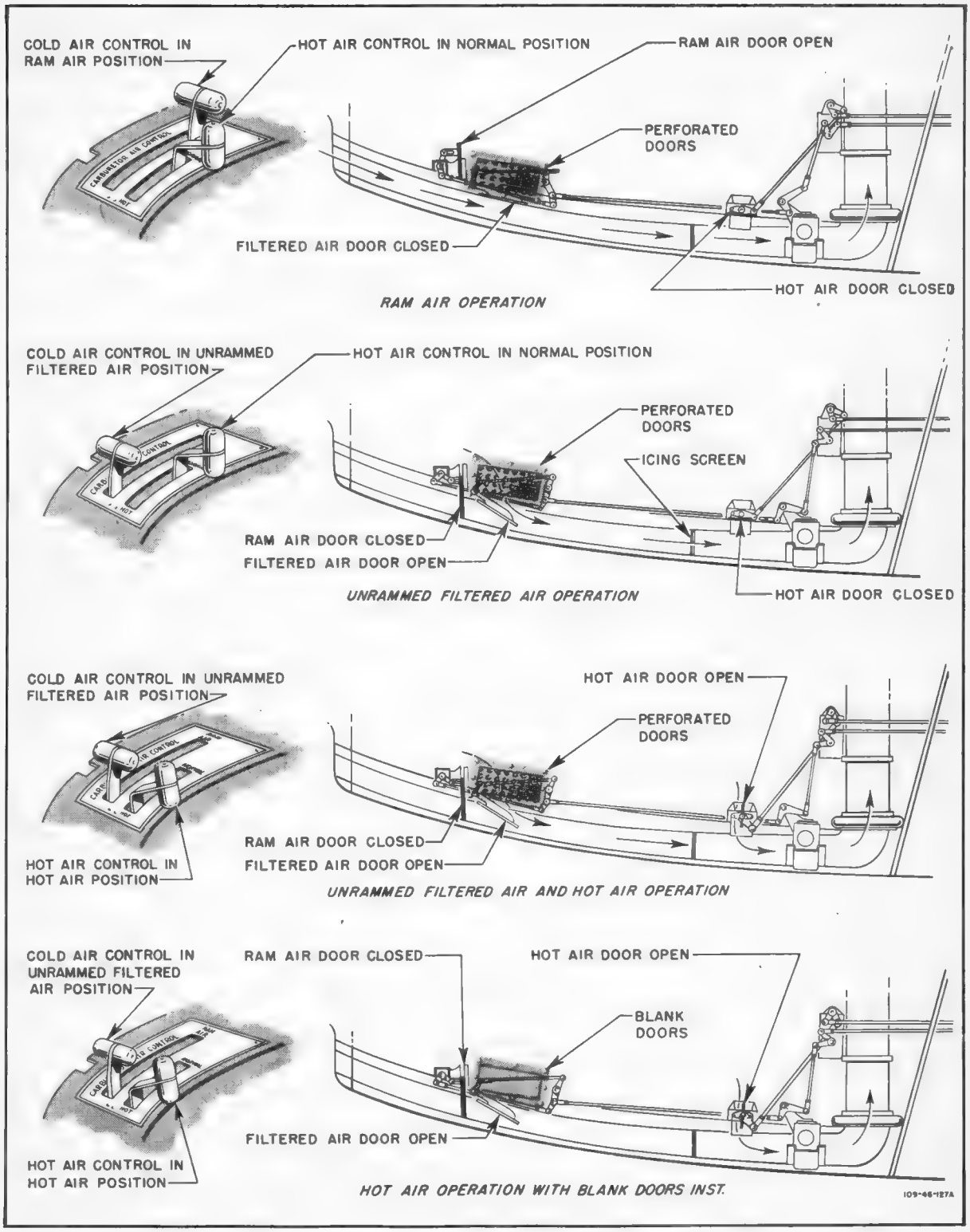


Figure 49—Operation of Carburetor Air Induction System

to "UNRAMMED FILTERED AIR." On late airplanes, move carburetor heat control to "HOT."

WARNING

Do not use carburetor heat on V-1650-3 and V-1650-7 engines above 12,000 feet unless flying in icing conditions. If carburetor heat is required above 12,000 feet, it should be used with discretion since excessive leaning of the fuel-air mixture may occur. The automatic altitude compensator in the carburetor is adversely affected by high temperature and low density conditions. If leaning becomes severe, as indicated by rough engine operation, power should be reduced or the use of heat discontinued.

CAUTION

Because of the constant-speed propeller governor and the automatic manifold pressure regulator, it is difficult to determine whether ice is forming other than by irregular engine operation, since neither the rpm nor the manifold pressure should change.

(d) Increase propeller speed momentarily by approximately 200 rpm every half-hour to assure continued governing at extremely low temperatures. Return to the desired cruising rpm as soon as the tachometer shows that the governor is functioning.

(e) Stay on a prearranged flight course as closely as possible, so that searchers will be able to find you if you are forced down. Except in extreme emergency, it is better to land or crash-land than to bail out.

(4) LANDING.—Temperature inversions are common in winter, and the ground may be 15° to 30°C (27° to 54°F) colder than that at altitude. Therefore, be careful to avoid excessive cooling when letting down. Lower the landing gear and use flaps to reduce air speed while descending. Retain considerable power, and if possible, maintain the oil temperature above 20°C and the coolant temperature above 60°C during all letdowns. Lower readings than these may result in the engine cutting out or the failure of the engine to respond when the throttle is advanced.

Note

When the outside air temperature is 0°C (32°F) or lower, it is advisable to use carburetor heat during landing to obtain better vaporization of fuel. This also helps prevent the engine from cutting out.

(5) AFTER LANDING.—To obtain sufficient dilution of the oil to facilitate starting, idle or stop the engine to cool it before starting dilution. This will prevent rapid evaporation of the gasoline and ensure that the viscosity of the oil has been reduced sufficiently. In most cases it will be found that the engine has cooled sufficiently for dilution by the time the airplane reaches the flight line. Dilute oil as follows:

(a) Operate the engine at 1000 rpm and maintain an oil temperature of 50°C or less.

(b) For ground temperatures of 5°C (40°F) or less, hold oil dilution switch in the "ON" position for 3 minutes (maximum); then stop engine and release oil dilution switch.

Note

It has been determined through tests conducted on V-1650 engines that diluting the oil more than 10 percent will cause the scavenge system to fail. Therefore, restrict the period of oil dilution to a *maximum* of 3 minutes. When the outside air temperature is such that 3 minutes oil dilution is insufficient, drain the oil and refill the system with warm oil before starting the engine.

2. DESERT OPERATION.

Dust filters are installed in the air intake ducts, at each side of the engine compartment. When conditions warrant, or at the direction of the Operations Officer, use "UNRAMMED FILTERED AIR" for starting, take-off, and landing.

Appendix I

OPERATING CHARTS, TABLES, CURVES AND DIAGRAMS

A-1. ARMOR PROTECTION.

Armor protection is illustrated in figure 50.

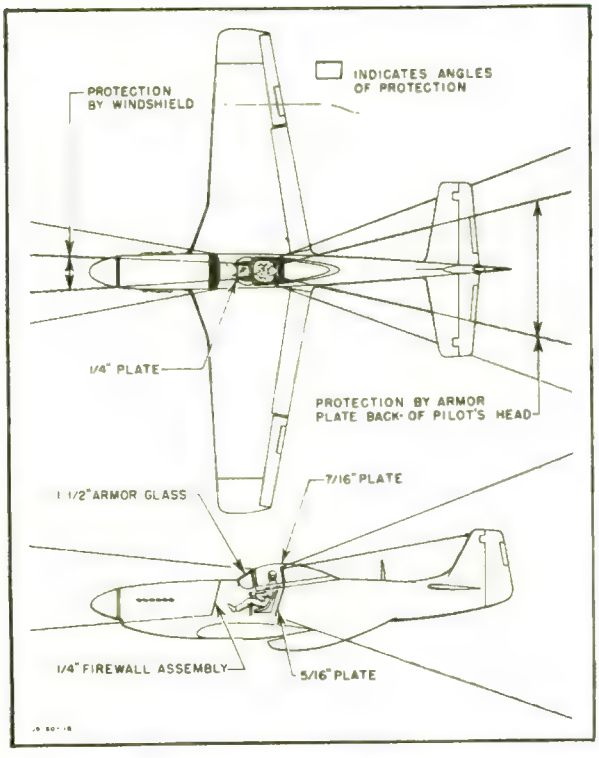


Figure 50—Armor Protection

A-2. FLIGHT PLANNING.

A-3. GENERAL.

A-4. A series of charts are provided on the following pages to aid in selecting the speeds and powers required to obtain various ranges. These charts are divided into two sets: (1) Take-off, Climb and Landing Chart, (2) Flight Operation Instruction Charts.

A-5. These charts are provided to give the pilot sufficient data to determine a safe and efficient flight plan. Inasmuch as the number of variables involved makes very accurate range predictions impossible the ranges and fuel flows quoted are conservative. For example, data based on flight test data (shown in black) are 5% conservative. The speeds quoted on any one chart are those obtained with gross weight equal to the high limit of the weight band shown on the chart. This policy along with the previously mentioned 5% conservatism makes allowances for differences in airplanes such as speeds, fuel flows, engine power output, pilot technique, etc. *No allowances* have been made for wind, navigational error, combat, formation flights, or endurance reserve. Appropriate allowances should be dictated by local policy.

A-6. The charts are arranged to give maximum facility for pre-flight and in-flight range planning. The following will be noted on inspection.

a. The climb chart gives fuel requirements for warm-up, take-off, and climb to any altitude for three typical weights. The fuel tabulated in the column labeled "at sea level" shows the allowance for warm-up, taxi, and take-off. Fuel requirements listed at other altitudes include this allowance plus the fuel required to climb from sea level. If it is desired to determine the fuel required to make an in-flight

climb from one altitude to another, i.e., 15,000 feet to 30,000 feet, the difference of the tabulated fuel required to climb to these two altitudes will be the climb fuel necessary.

b. Take-off and landing distances are shown for various combinations of gross weight, field altitude, winds, and type runways.

c. Seven Flight Operation Instruction Charts covering the various loading combinations for this airplane are presented.

d. Maximum to minimum practical fuel loadings are entered on each chart under the fuel column.

e. Data listed under Column I is for high speed cruising at max continuous (normal rated power). Columns II, III, IV, and V give progressive increases in range with a sacrifice in speed. Ranges shown in any column for a given fuel quantity can be obtained at various altitudes by using the power settings listed in the lower half of the chart in the same column.

f. Ranges shown on a given chart are based on fuel flows obtained by resetting power as gross weight changes to lower weight bracket on succeeding charts.

A-7. USE OF CHARTS.

A-8. The following sample problem based on a typical P-51D mission and employing actual chart values demonstrates how the charts should be used.

A-9. It is required that a P-51D be ferried to a base located 1750 miles from the factory. The first section (1000 miles) consists of climb to and cruise at 10,000 feet and the second section (750 miles) consists of climb from 10,000 feet to 15,000 feet and cruise at 15,000 feet to avoid mountainous terrain, and descent. Drop tanks will be carried all the way.

A-10. Write down the conditions of the problem and the questions to be answered.

Required range	1,750 miles
Weather	CAVU
Winds (at factory)	15 mph headwind at 10,000 ft.
Winds (1,000 miles out)	10 mph tailwind at 15,000 ft.
Aircraft basic weight (includes trapped fuel, oil, misc equipment)	7,653 lb
Crew weight (1)	200 lb
Oil (12.5 gal)	94 lb
Drop tanks (2—110 gal)	180 lb
Total weight (less fuel)	8,127 lb
Max fuel capacity (489 gal)	2,934 lb
Total gross weight	11,061 lb.

A-11. Determination of the actual flight plan. Now that the conditions of the flight have been determined, it becomes necessary to establish a flight plan as follows:

a. The cruise will be started at 10,000 feet.

b. Determine the fuel available for flight planning by deducting the necessary fuel allowances and reserves from the actual fuel available.

General reserve for unexpected difficulties—53 gallons.

It will be noted that 53 gallons of fuel represent one hour's flying time in Column V at a gross weight of 10,300 pounds to 8100 pounds (figure 55) at 15,000 feet. One hour's fuel reserve is considered sufficient for this type mission. The endurance is figured at the lightest weight because reserve fuel, obviously, will not be used until this light weight is reached. Fifteen thousands feet is the altitude at the end of the cruise due to terrain.

Wind reserve (1st section)—13 gallons.

This figure is arrived at as follows: the 1st section of the trip is 1,000 miles in length and, assuming it will be flown in Column IV, the airspeed will be 272 mph (find airspeed opposite the 10,000 foot entry in Column IV of the 12,200 pound to 10,300 pound chart). Therefore, the no-wind time of the 1st section will be 1,000/272=3.68 hours. The actual time allowing for a 15 mph headwind is 1,000/(272—15)=3.89 hours. The fuel required for the headwind at 62 gph is (3.89—3.68) x 62=13 gallons.

Wind reserve (2d section)—0 gallons.

Normally, tailwinds are treated as a no-wind condition.

Warm-up, take-off, and climb to 10,000 feet—26 gallons.

Reference to Climb Data Chart shows 26 gallons are required for warm-up, take-off, and climb to 10,000 feet when the airplane weighs 11,000 pounds.

Climb from 10,000 feet to 15,000 feet—5 gallons.

After completing the 1st section, the airplane will be climbed to 15,000 feet to avoid terrain. The climb will not be made until the 1st section or 1,000 miles have been flown. Reference to the Climb Data Chart using an estimated gross weight of 10,000 pounds shows that 29 gallons are required to climb to 15,000 feet and that 24 gallons are required to climb to 10,000 feet. The difference between the quantities is 5 gallons or the amount of fuel necessary to climb from 10,000 feet to 15,000 feet.

Collecting all the required fuel allowances:

General reserve for unexpected difficulties	53 gal
Wind reserve (1st section)	13 gal
Wind reserve (2d section)	0 gal
Warm-up, take-off, and climb to 10,000 ft at 11,000 lb	26 gal
Climb from 10,000 ft to 15,000 ft	5 gal
Total Allowances	97 gal

Therefore, the actual fuel for level flight cruising at zero wind is: 489—97=382 gallons. Reference to the 12,200 pound to 10,300 pound chart (figure 55) shows that 1,770 miles can be flown with 400 gallons in Column IV. 1,750 miles will require approximately 396 gallons. This unconservative difference of 4 (396—392) gallons is negligible and this answer gives you a quick solution of the problem.

c. However, to ascertain that the mission is actually being flown in the most efficient manner, a more thorough analysis of the problem will have to be accomplished. It has been noted that the charts are divided into approximate 2,000 pound increments; and since the airplane weight will vary by more than 2,000 pounds, it will be necessary to divide the flight into several legs. (Note: the use of 333 gallons of fuel will reduce the airplane weight by 2,000 pounds.)

Leg	Fig.	Initial Wt.	Fuel Aboard	Condition	Altitude	Power Settings	Fuel Used	Distance
1	51	11,061	489	Warm-up, Take-off, and Climb	S.L. to 10,000 ft	2700 rpm 46 MP RUN	26	0

Entries whose derivation may not be clear are explained as follows:

INITIAL WEIGHT:

This was computed in paragraph A-10.

RPM, MP, MIXTURE, AND FUEL USED:

These items are read directly from the charts.

Note

Time consumed and distance covered in climbing is considered negligible in this instance; however, these items should be considered in extremely long climbs.

The second leg of the flight will be accomplished at 10,000 feet in accordance with the information as contained in the 12,200-pound to 10,300-pound chart with Column IV conditions:

Leg	Fig.	Gross Wt.	Fuel Remaining	Power Settings	GPH	TAS	Ground Speed	Hours	Dist. Ground Miles	Fuel Used
2	55 Sheet 1	10,905	463	1950 RPM 37.5 MP RUN	62	272	257	1.63	418	101

Note: Length of leg 2 is determined by the time required for the gross weight to decrease to 10,300 pounds.

GROSS WEIGHT:

In using 156 pounds of fuel in warm-up, take-off, and climb, weight becomes 11,061 — 156 = 10,905 pounds. (Use fuel weight as 6 pounds per gallon.)

FUEL REMAINING:

Fuel was reduced 26 gallons in leg 1.

RPM, MP, MIXTURE, GPH, AND TAS:

These items are read directly as entries opposite 10,000 feet in Column IV.

FUEL USED:

Calculated by subtracting upper weight limit of the following chart from the gross weight. (10,905 — 10,300 = 605 pounds or 101 gallons.)

HOURS:

The time was arrived at by dividing the fuel used by the fuel flow, i.e., 101/62 = 1.63 hours.

GROUND SPEED:

This was determined by subtracting the headwind from the TAS, i.e., 272 — 15 = 257 mph.

DISTANCE:

The mileage was calculated by multiplying the ground speed by the hours, i.e., 257 × 1.63—418 miles.

Now that the gross weight has been reduced to 10,300 pounds, the remainder of the flight will be flown on the basis of the information listed on the 10,300 pound to 8,100 pound chart.

Leg	Fig.	Gross Weight	Fuel Remaining	Power Settings	GPH	TAS	G.S.	Hours	Dist.	Fuel Used
3	55 Sheet 2	10,300	362	1750 RPM 35.5 MP RUN	54	259	244	2.38	582	129

Note: Length of leg 3 is determined by the distance remaining to the point at which the climb to 15,000 feet is started. 1,000 — 418 = 582 miles (remaining distance).

GROSS WEIGHT:

In using 101 gallons or 605 pounds of fuel to fly leg 2, the weight becomes 10,905 pounds — 605 = 10,300 pounds.

FUEL REMAINING:

Fuel was reduced 101 gallons in leg 2.

RPM, MP, MIXTURE, GPH, TAS:

These items are read directly as entries opposite 10,000 feet in Column IV.

GROUND SPEED:

The speed was determined by subtracting the headwind from the true airspeed, i.e., 259 — 15 — 244 mph.

HOURS:

The time was arrived at by dividing the remaining distance by the ground speed, i.e., 582/244—2.38 hours.

FUEL USED

Multiply gph by hours = 54 × 2.38 = 129 gallons.

Upon reaching the point 1,000 miles from the factory it is planned to climb to 15,000 feet:

Leg	Fig.	Gross Weight	Fuel Remaining	Condition	Altitude	Power Settings	Fuel Used
4	51	9,526	233	Climb	10,000 ft. to 15,000 ft.	2700 RPM 46 MP RUN	5

GROSS WEIGHT:
In using 774 pounds (129 gallons) of fuel to fly leg 3, the gross weight becomes 10,300 — 744 = 9.526 pounds.

FUEL REMAINING:
Fuel was reduced 129 gallons in leg 3.

RPM, MP MIXTURE:
These items are read directly from the Climb Data Chart.

FUEL USED:
This quantity is determined from the Climb Data chart opposite 10,000 pounds gross weight. Subtract the amount of fuel used for climb to 15,000 feet from the amount of fuel used for climb to 10,000 feet (29 — 24 = 5 gallons). The time and distance are neglected in this case.

Leg	Fig.	Gross Weight	Fuel Remaining	Altitude	Power Settings	GPH	TAS	G.S.	Hr.	Dist.	Fuel Used
5	55 Sheet 2	9,496	228	15,000 ft.	2000 RPM FT RUN	59	279	279	2.69	750	159

Note: Leg 5 is the distance from the predetermined climb point to the destination.

GROSS WEIGHT:
In using 30 pounds (5 gallons) of fuel to fly leg 4, gross weight becomes 9,526 — 30 = 9,496 pounds.

FUEL REMAINING:
Fuel was reduced 5 gallons in leg 4.

RPM, MP, MIXTURE, GPH, TAS:
These items are read directly as entries opposite 15,000 feet in Column IV.

GROUND SPEED:
This speed equals TAS for the last 750 miles as the tailwind is considered as no wind in this instance.

HOURS:
The time was computed by dividing the distance by the ground speed, i.e., 750/279 = 2.69 hours.

FUEL USED:
Multiply gph by hours, i.e., 59 × 2.69 = 159 gallons.

Calculated fuel remaining at end of flight is 228 — 159 = 69 gallons. The original allowance for contingencies was 53 gallons, so that an excess (due to more accurate step by step analysis) of 16 gallons above requirements is available.

A-12. Suppose that upon arrival at the destination, the field is closed in due to bad weather and an alternate field 250 miles farther on is selected. Reference to figure 55, sheet 2, Column V, indicates 200 mile maximum range at zero wind for 40 gallons. Sixty-nine gallons will allow approximately 350 miles. At 15,000 feet the TAS would be 261 mph. Ground speed would be the same or dependent upon wind. The time for flight is 250/261 = .96 hours. Fuel required would be 53 gph × .96 hours = 51 gallons. This would leave 18 gallons in the tanks upon arrival at the alternate field, i.e., 69—51—18 gallons. A slight advantage would be obtained by dropping external tanks and flying according to operating conditions as listed for the "clean" airplane on figure 52.

AAFMC-527
4-1-44

AIRCRAFT MODEL(S)
P-51D AND K

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODEL(S)
V-1650-7

TAKE-OFF DISTANCE FEET

GROSS WEIGHT LB.	HEAD WIND M.P.H.	HEAD WIND KTS.	HARD SURFACE RUNWAY AT SEA LEVEL GROUND RUN	HARD SURFACE RUNWAY AT SEA LEVEL TO CLEAR 50' OBJ.	HARD SURFACE RUNWAY AT 3000 FEET GROUND RUN	HARD SURFACE RUNWAY AT 3000 FEET TO CLEAR 50' OBJ.	HARD SURFACE RUNWAY AT 6000 FEET GROUND RUN	HARD SURFACE RUNWAY AT 6000 FEET TO CLEAR 50' OBJ.	SOD-TURF RUNWAY AT SEA LEVEL GROUND RUN	SOD-TURF RUNWAY AT SEA LEVEL TO CLEAR 50' OBJ.	SOD-TURF RUNWAY AT 3000 FEET GROUND RUN	SOD-TURF RUNWAY AT 3000 FEET TO CLEAR 50' OBJ.	SOD-TURF RUNWAY AT 6000 FEET GROUND RUN	SOD-TURF RUNWAY AT 6000 FEET TO CLEAR 50' OBJ.	SOFT SURFACE RUNWAY AT SEA LEVEL GROUND RUN	SOFT SURFACE RUNWAY AT SEA LEVEL TO CLEAR 50' OBJ.	SOFT SURFACE RUNWAY AT 3000 FEET GROUND RUN	SOFT SURFACE RUNWAY AT 3000 FEET TO CLEAR 50' OBJ.	SOFT SURFACE RUNWAY AT 6000 FEET GROUND RUN	SOFT SURFACE RUNWAY AT 6000 FEET TO CLEAR 50' OBJ.
11,000	0	0	1800	2700	2000	3000	2300	3100	2000	2800	2100	3100	2400	3400	2300	3200	2500	3400	2800	3900
	17	15	1400	2100	1500	2300	1800	2600	1500	2200	1600	2400	1900	2700	1700	2500	1900	2700	2200	3100
	34	30	1000	1600	1100	1800	1300	2100	1100	1700	1200	1900	1400	2100	1200	1900	1400	2100	1600	2400
	51	45	700	1200	800	1300	900	1500	700	1200	800	1400	1000	1600	800	1300	1000	1500	1200	1700
10,000	0	0	1600	2400	1800	2500	2000	2800	1700	2400	1800	2600	2100	3000	1900	2700	2100	2900	2400	3200
	17	15	1200	1800	1300	2000	1500	2300	1300	1900	1400	2100	1600	2400	1400	2100	1600	2300	1800	2500
	34	30	900	1400	1000	1500	1100	1800	900	1400	1000	1600	1200	1800	1000	1600	1200	1700	1300	2000
	51	45	600	1000	700	1100	800	1300	600	1000	700	1200	800	1300	700	1100	800	1200	900	1500
9000	0	0	1400	2000	1500	2200	1700	2500	1400	2100	1600	2300	1800	2500	1600	2300	1800	2500	2000	2800
	17	15	1000	1600	1200	1700	1300	2000	1100	1600	1200	1800	1400	2000	1200	1800	1300	1900	1500	2200
	34	30	700	1200	800	1300	1000	1500	800	1200	900	1400	1000	1500	900	1300	1000	1400	1100	1700
	51	45	500	800	600	1000	700	1100	500	900	600	1000	700	1100	600	900	700	1000	800	1200

NOTE: INCREASE CHART DISTANCES AS FOLLOWS: 75°F + 10%; 100°F + 20%; 125°F + 30%; 150°F + 40%
DATA AS OF 8-20-44 BASED ON: FLIGHT TESTS

OPTIMUM TAKE-OFF WITH 3000 RPM, 61 IN.HG. & 20 DEG. FLAP IS 80% OF CHART VALUES

CLIMB DATA

GROSS WEIGHT LB.	AT SEA LEVEL BEST I.A.S. MPH	AT SEA LEVEL BEST I.A.S. KTS	AT SEA LEVEL RATE OF CLIMB F.P.M.	AT SEA LEVEL GAL. OF FUEL USED	AT 5000 FEET BEST I.A.S. MPH	AT 5000 FEET BEST I.A.S. KTS	AT 5000 FEET RATE OF CLIMB F.P.M.	AT 5000 FEET FROM SEA LEVEL TIME MIN.	AT 5000 FEET FROM SEA LEVEL FUEL USED	AT 10,000 FEET BEST I.A.S. MPH	AT 10,000 FEET BEST I.A.S. KTS	AT 10,000 FEET RATE OF CLIMB F.P.M.	AT 10,000 FEET FROM SEA LEVEL TIME MIN.	AT 10,000 FEET FROM SEA LEVEL FUEL USED	AT 15,000 FEET BEST I.A.S. MPH	AT 15,000 FEET BEST I.A.S. KTS	AT 15,000 FEET RATE OF CLIMB F.P.M.	AT 15,000 FEET FROM SEA LEVEL TIME MIN.	AT 15,000 FEET FROM SEA LEVEL FUEL USED	AT 25,000 FEET BEST I.A.S. MPH	AT 25,000 FEET BEST I.A.S. KTS	AT 25,000 FEET RATE OF CLIMB F.P.M.	AT 25,000 FEET FROM SEA LEVEL TIME MIN.	AT 25,000 FEET FROM SEA LEVEL FUEL USED	AT 35,000 FEET BEST I.A.S. MPH	AT 35,000 FEET BEST I.A.S. KTS	AT 35,000 FEET RATE OF CLIMB F.P.M.	AT 35,000 FEET FROM SEA LEVEL TIME MIN.	AT 35,000 FEET FROM SEA LEVEL FUEL USED
11,000	175	150	1450	15	175	150	1500	3.4	20	175	150	1500	6.8	26	170	150	1450	10.5	31	165	145	1100	19	44	145	130	150	39	76
10,000	175	150	1750	15	175	150	1750	2.8	20	175	150	1800	5.6	24	170	150	1800	8.5	29	165	145	1400	15	40	145	130	450	27	58
9000	175	150	2050	15	175	150	2100	2.4	19	175	150	2150	4.8	23	170	150	2150	7.5	27	165	145	1800	13	36	145	130	750	20	48

POWER PLANT SETTINGS: (DETAILS ON FIG. 29, SECTION III): MAX. CONTINUOUS POWER
DATA AS OF 2-26-47 BASED ON:

FUEL USED (U.S.GAL.) INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

LANDING DISTANCE FEET

GROSS WEIGHT LB.	BEST IAS APPROACH POWER OFF MPH	BEST IAS APPROACH POWER OFF KTS	BEST IAS APPROACH POWER ON MPH	BEST IAS APPROACH POWER ON KTS	HARD DRY SURFACE AT SEA LEVEL GROUND ROLL	HARD DRY SURFACE AT SEA LEVEL TO CLEAR 50' OBJ.	HARD DRY SURFACE AT 3000 FEET GROUND ROLL	HARD DRY SURFACE AT 3000 FEET TO CLEAR 50' OBJ.	HARD DRY SURFACE AT 6000 FEET GROUND ROLL	HARD DRY SURFACE AT 6000 FEET TO CLEAR 50' OBJ.	FIRM DRY SOD AT SEA LEVEL GROUND ROLL	FIRM DRY SOD AT SEA LEVEL TO CLEAR 50' OBJ.	FIRM DRY SOD AT 3000 FEET GROUND ROLL	FIRM DRY SOD AT 3000 FEET TO CLEAR 50' OBJ.	FIRM DRY SOD AT 6000 FEET GROUND ROLL	FIRM DRY SOD AT 6000 FEET TO CLEAR 50' OBJ.	WET OR SLIPPERY AT SEA LEVEL GROUND ROLL	WET OR SLIPPERY AT SEA LEVEL TO CLEAR 50' OBJ.	WET OR SLIPPERY AT 3000 FEET GROUND ROLL	WET OR SLIPPERY AT 3000 FEET TO CLEAR 50' OBJ.	WET OR SLIPPERY AT 6000 FEET GROUND ROLL	WET OR SLIPPERY AT 6000 FEET TO CLEAR 50' OBJ.
10,000	130	115	130	115	1300	2500	1600	2600	1700	2800	1500	2600	1700	2800	1900	3000	3500	4800	3900	5100	4400	5500
9000	130	115	130	115	1200	2300	1400	2400	1500	2600	1400	2400	1600	2600	1700	2800	3200	4300	3500	4600	3900	5000
8000	130	115	130	115	1100	2100	1200	2200	1400	2400	1300	2200	1400	2400	1500	2600	2900	3800	3100	4100	3400	4500

DATA AS OF 8-20-44 BASED ON: FLIGHT TESTS

OPTIMUM LANDING IS 80% OF CHART VALUES

REMARKS:

NOTE: TO DETERMINE FUEL CONSUMPTION IN BRITISH IMPERIAL GALLONS, MULTIPLY BY 10, THEN DIVIDE BY 12

LEGEND
I.A.S. : INDICATED AIRSPEED
M.P.H. : MILES PER HOUR
KTS. : KNOTS
F.P.M. : FEET PER MINUTE

For use with V-1650-7 engine only regardless of airplane model.

Figure 51—Take-off, Climb, and Landing Chart

For use with V-1650-7 engine only regardless of airplane model.

AAFHC-528 5-1-44

AIRCRAFT MODEL(S) P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,200 TO 8,000 POUNDS

EXTERNAL LOAD ITEMS
WING RACKS ONLY

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	*3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 28 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		269[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						269[2]		
950	825	260	1065	920	1195	1040	1300	1130	260	1440	1250
880	765	240	985	855	1105	960	1200	1040	240	1330	1155
805	700	220	900	780	1010	875	1100	955	220	1220	1060
730	635	200	820	710	920	800	1000	870	200	1110	965
640	555	180	740	645	830	720	900	780	180	1000	870
685	510	160	655	570	735	640	800	695	160	890	775
615	445	140	575	500	645	560	700	610	140	775	675
440	380	120	490	425	550	475	600	520	120	665	580
365	315	100	410	355	460	400	500	435	100	555	480
295	255	80	330	285	370	320	400	350	80	445	385
220	190	60	245	210	275	240	300	260	60	335	290
145	125	40	165	145	185	160	200	175	40	220	190
75	65	20	80	70	90	78	100	87	20	110	95

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(4.10 STAT. (3.56 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.60 STAT. (4.00 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.00 STAT. (4.34 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
SEE COLUMN II						40000 35000 30000	2700	F.T.	RUN	97	424	368	2650	F.T.	RUN	90	417	362	2700 2450	F.T. F.T.	RUN RUN	80 77	408 391	354 340	2500 2250	F.T. F.T.	RUN RUN	66 62	367 348	319 302
SEE COLUMN II SEE COLUMN II						25000 20000	2700 2700	46 46	RUN RUN	98 93	413 389	358 338	2400 2400	42 42.5	RUN RUN	86 80	397 371	345 322	2250 2100	F.T. 36.5	RUN RUN	73 67	370 346	321 300	1850 2100	F.T. F.T.	RUN RUN	59 57	335 316	291 274
2700	46	RUN	103	384	334	15000	2500	F.T.	RUN	90	373	324	2300	F.T.	RUN	76	351	305	2100	F.T.	RUN	65	326	283	1800	F.T.	RUN	52	290	252
2700	46	RUN	98	361	314	10000	2500	42.5	RUN	[illegible]	346	300	2200	40	RUN	71	325	282	1900	37	RUN	60	300	261	1600	31	RUN	47	261	227
2700	46	RUN	91	339	286	5000	2500	43	RUN	79	323	280	2200	40	RUN	66	303	263	1850	36.5	RUN	55	278	242	1600	28.5	RUN	42	232	202
2700	46	RUN	86	315	274	S.L.	2500	43	RUN	74	300	261	2150	39.5	RUN	61	279	242	1800	36	RUN	50	255	222	SEE COLUMN IV					

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAX. FUEL CAPACITY WITH FULL WING & FUSELAGE TANKS.

HIGH BLOWER ABOVE HEAVY LINE.

EXAMPLE

AT 9,500 LB. GROSS WEIGHT WITH 80 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 330 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2500 RPM AND 43 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-22-47
DATA AS OF 5-20-44 BASED ON: FLIGHT TESTS

For use with V-1650-7 engine only regardless of airplane model.

Figure 52—Flight Operation Instruction Chart—Wing Racks

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-528 5-1-44

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,200 TO 9,800 POUNDS

EXTERNAL LOAD ITEMS
TWO 500 LB. BOMBS
OR TWO 75 GAL. WING TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "	FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		419[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						419[2]		
1390	1205	410	1485	1290	1685	1465	1855	1610	410	1995	1735
1320	1145	390	1430	1240	1600	1390	1765	1535	390	1895	1650
1250	1085	370	1350	1175	1515	1315	1670	1450	370	1795	1560
1185	1030	350	1280	1110	1435	1250	1580	1370	350	1700	1480
1120	975	330	1200	1040	1350	1170	1490	1295	330	1600	1390
1050	910	310	1130	980	1265	1100	1400	1220	310	1500	1305
985	855	290	1050	915	1180	1050	1305	1135	290	1400	1220
915	795	270	980	850	1100	955	1215	1055	270	1300	1130
845	735	250	900	785	1015	885	1115	970	250	1200	1045
780	675	230	830	720	930	810	1030	895	230	1110	965
710	615	210	755	655	850	740	945	820	210	1010	880
645	560	190	685	595	770	670	855	745	190	915	795
575	500	170	610	530	690	600	765	665	170	820	715
510	445	150	540	470	605	525	675	585	150	720	625

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.60 STAT. (3.13 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.05 STAT. (3.52 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.49 STAT. (3.90 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000						
						35000																			35000						
	SEE COLUMN III					30000							2700	F.T.	RUN	94	383	333	2500	F.T.	RUN	79	356	310	30000	2300	F.T.	RUN	63	315	274
	SEE COLUMN II					25000	2700	46	RUN	98	377	328	2550	44	RUN	90	367	319	2300	F.T.	RUN	76	341	297	25000	2100	F.T.	RUN	60	305	265
	SEE COLUMN II					20000	2700	46	RUN	93	356	309	2500	44	RUN	85	344	299	2150	38	RUN	70	319	277	20000	2200	F.T.	RUN	61	294	256
2700	46	RUN	103	356	310	15000	2600	44.5	RUN	97	349	303	2400	F.T.	RUN	80	327	284	2200	F.T.	RUN	68	303	263	15000	1950	F.T.	RUN	57	277	241
2700	46	RUN	98	334	290	10000	2600	44.5	RUN	91	326	284	2300	41	RUN	75	304	264	2000	38	RUN	63	281	244	10000	1650	34.5	RUN	52	252	219
2700	46	RUN	91	312	271	5000	2600	44	RUN	84	304	264	2300	41	RUN	70	283	246	1950	37.5	RUN	58	260	226	5000	1600	34	RUN	48	230	200
2700	46	RUN	86	292	254	S.L.	2550	44	RUN	78	282	245	2250	40.5	RUN	65	262	228	1900	37	RUN	53	239	208	S.L.	1600	31	RUN	42	202	176

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAX. FUEL CAPACITY WITH 2-75 GAL. WING, ST'D. WING TANKS & FUSELAGE TANKS,
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10000 LB. GROSS WEIGHT WITH 210 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 850 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2300 RPM AND 41 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN. WHEN WEIGHT REACHES 9,800 LBS. USE POWER SETTINGS SHEET 2, COLUMN III.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 53 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-520 4-1-44

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 9,800 TO 8,100 POUNDS

EXTERNAL LOAD ITEMS
TWO 500 LB. BOMBS
OR TWO 75 GAL. WING TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND)[2]. TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[3]								
950	825	280	1050	915	1170	1020	1275	1110	280	1380	1200
880	765	260	975	845	1090	945	1185	1030	260	1280	1110
815	710	240	900	785	1005	875	1090	945	240	1185	1030
745	645	220	825	715	920	800	1000	870	220	1085	940
680	590	200	750	650	835	725	910	790	200	990	860
610	530	180	675	585	755	655	820	715	180	890	775
545	475	160	600	520	670	580	730	635	160	790	685
475	415	140	525	455	585	510	635	550	140	690	600
405	350	120	450	390	500	435	545	475	120	590	515
340	295	100	375	325	420	365	455	395	100	495	430
270	235	80	300	260	335	290	365	315	80	395	345
205	180	60	225	195	250	220	275	240	60	295	255
135	115	40	150	130	165	145	180	155	40	195	170

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.75 STAT. (3.25 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.18 STAT. (3.64 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.[4]	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.55 STAT. (3.96 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000						
	SEE COLUMN IV					35000													2700	F.T.	RUN	80	370	322	35000	2450	F.T.	RUN	65	327	284
	SEE COLUMN III					30000							2650	F.T.	RUN	90	381	331	2500	F.T.	RUN	78	360	313	30000	2300	F.T.	RUN	65	326	283
	SEE COLUMN II					25000	2700	46	RUN	98	377	328	2450	42.5	RUN	87	362	314	2300	F.T.	RUN	75	342	297	25000	2100	F.T.	RUN	62	311	270
	SEE COLUMN II					20000	2700	46	RUN	93	355	308	2400	42.5	RUN	80	337	293	2150	38	RUN	70	318	276	20000	2150	F.T.	RUN	59	294	256
2700	46	RUN	103	356	309	15000	2550	43	RUN	91	341	296	2350	F.T.	RUN	79	322	280	2150	F.T.	RUN	66	300	261	15000	1900	F.T.	RUN	55	272	236
2700	46	RUN	98	333	289	10000	2500	43	RUN	83	316	275	2200	40	RUN	71	298	259	1950	37	RUN	61	278	242	10000	1600	34	RUN	50	251	218
2700	46	RUN	91	311	270	5000	2450	42.5	RUN	77	293	255	2200	40	RUN	66	276	240	1900	37	RUN	55	256	222	5000	1600	32.5	RUN	46	229	199
2700	46	RUN	86	291	253	S.L.	2450	42.5	RUN	72	273	237	2150	39.5	RUN	61	256	222	1850	37	36.5	51	236	205	S.L.	1600	29.5	RUN	41	200	174

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 9,400 LB. GROSS WEIGHT WITH 100 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 420 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2200 RPM AND 40 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 53 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-528 4-1-44

AIRCRAFT MODEL(S) P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 13,000 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS + 2-75 GAL. WING TANKS
OR 6 ROCKETS + 2-110 GAL. WING TANKS
OR 6 ROCKETS + 1-110 GAL. W. TANK + 1-1000# BOMB
OR 6 ROCKETS + 2-1000# BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. 29SECT. III)
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "	
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[4] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		489[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						489[2]		
1490	1295	480	1590	1380	1740	1510	1860	1620	480	1940	1685
1395	1210	450	1485	1290	1625	1410	1730	1505	450	1810	1570
1300	1130	420	1380	1200	1510	1310	1600	1390	420	1680	1460
1205	1045	390	1280	1110	1390	1210	1475	1280	390	1550	1350
1110	965	360	1175	1020	1275	1110	1345	1170	360	1415	1230
1015	880	330	1070	930	1160	1010	1220	1060	330	1290	1120
925	805	300	970	845	1055	915	1110	965	300	1170	1015
830	720	270	875	760	950	825	1000	870	270	1055	915
740	645	240	780	680	840	730	890	775	240	935	810
645	560	210	680	590	740	645	775	675	210	820	715
555	480	180	585	510	630	550	665	580	180	700	610
460	400	150	485	420	525	455	555	480	150	585	510
370	320	120	390	340	420	365	445	385	120	470	410

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.24 STAT. (2.82 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.51 STAT. (3.05 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.70 STAT. (3.22 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000							
						35000																			35000							
						30000																			30000							
	SEE COLUMN I					25000	2700	46	RUN	98	332	288	2550	44	RUN	92	323	281	2350	F.T.	RUN	80	295	256	25000							
	SEE COLUMN I					20000	2700	46	RUN	93	314	273	2550	44.5	RUN	86	304	264	2350	41	RUN	77	285	248	20000							
2700	46	RUN	103	322	280	15000	2600	44.5	RUN	97	314	273	2450	F.T.	RUN	85	299	260	2350	F.T.	RUN	77	284	247	15000	2100	F.T.	RUN	63	245	213
2700	46	RUN	98	302	262	10000	2600	44.5	RUN	91	295	256	2400	42	RUN	80	281	244	2250	40	RUN	72	267	232	10000	1950	37.5	RUN	61	240	209
2700	46	RUN	91	283	246	5000	2600	44.5	RUN	85	275	239	2400	42	RUN	74	261	227	2200	40	RUN	66	247	215	5000	1950	36	RUN	57	223	194
2700	46	RUN	86	265	230	S.L.	2600	44	RUN	78	256	222	2350	41.5	RUN	69	243	211	2200	40	RUN	62	231	201	S.L.	1900	37	RUN	53	205	178

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAX. FUEL CAPACITY WITH 2-110 GAL. WING TANKS, ST'D. WING TANKS & FUSELAGE TANKS.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,800 LB. GROSS WEIGHT WITH 330 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 26 GAL.) TO FLY 1220 STAT. AIRMILES AT 10,000 FT. ALTITUDE MAINTAIN 2250 RPM AND 40 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN. WHEN WEIGHT REACHES 11,000 LBS. USE POWER SETTINGS SHEET 2, COLUMN IV.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-23-47
DATA AS OF 12-1-44 BASED ON: FLIGHT TESTS

For use with V-1650-7 engine only regardless of airplane model.

WP-2-1-47-1-1-M AAFMC-528 8-1-46

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 8,900 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS + 2-75 GAL. WING TANKS
OR 6 ROCKETS + 2-110 GAL. WING TANKS
OR 6 ROCKETS + 1-110 GAL. W.TANK + 1-1000# BOMB
OR 6 ROCKETS + 2-1000# BOMBS

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW	RUN	5 min.	135°C	210
	"	"	HIGH	"		"	"
MILITARY POWER	3000	61	LOW	RUN	15 min.	135°C	180
	"	"	HIGH	"		"	"

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[2] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[3]								
1040	905	330	1170	1015	1285	1115	1400	1220	330	1440	1250
950	825	300	1065	925	1170	1020	1275	1110	300	1310	1140
855	745	270	960	835	1050	910	1150	1000	270	1180	1025
760	660	240	850	740	935	815	1020	885	240	1050	915
665	580	210	745	645	820	715	895	775	210	915	795
520	450	180	640	555	700	610	765	665	180	785	680
475	415	150	530	460	585	510	635	550	150	655	570
380	330	120	425	370	470	410	510	445	120	525	455
285	250	90	320	280	350	305	380	330	90	390	425
190	165	60	215	185	235	205	255	220	60	260	226
95	83	30	105	91	115	100	125	110	30	130	115

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.56 STAT. (3.08 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.90 STAT. (3.39 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.25 STAT. (3.70 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000							
						35000																			35000							
						30000																			30000							
	SEE COLUMN II					25000	2700	46	RUN	98	350	304	2350	F.T.	RUN	81	322	280	2150	F.T.	RUN	64	276	240	25000							
	SEE COLUMN II					20000	2650	45.5	RUN	91	327	284	2300	41	RUN	77	303	263	2000	34.5	RUN	63	273	237	20000	2150	F.T.	RUN	60	261	227
2700	46	RUN	103	332	288	15000	2500	F.T.	RUN	89	316	275	2300	F.T.	RUN	74	292	254	2100	F.T.	RUN	63	269	234	15000	1950	F.T.	RUN	57	253	220
2700	46	RUN	98	311	270	10000	2500	43	RUN	83	295	256	2150	39.5	RUN	69	273	237	1900	37	RUN	60	253	220	10000	1650	34.5	RUN	52	225	196
2700	46	RUN	91	250	252	5000	2450	42.5	RUN	77	273	237	2100	39	RUN	65	252	219	1850	36.5	RUN	55	233	202	5000	1600	34	RUN	48	210	183
2700	46	RUN	86	272	236	S.L.	2400	42	RUN	71	254	221	2050	38.5	RUN	57	233	202	1800	36	RUN	50	212	184	S.L.	(SEE COLUMN IV)					

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,600 LB. GROSS WEIGHT WITH 270 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 26 GAL.) TO FLY 1150 STAT. AIRMILES AT 10000 FT. ALTITUDE MAINTAIN 1900 RPM AND 37 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-23-47
DATA AS OF 12-1-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

Figure 54 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-528 5-1-45

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,200 TO 10,300 POUNDS

EXTERNAL LOAD ITEMS
TWO 1000# BOMBS
OR ONE 1000# BOMBS + ONE 110 GAL. W. TANK
OR TWO 110 GAL. WING TANKS
(OR TEN 5" ROCKETS)

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "	FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		489[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						489[2]		
1590	1380	480	1745	1515	1955	1700	2145	1865	480	2250	1955
1455 1325 1190	1265 1150 1035	440 400 360	1595 1445 1295	1385 1255 1125	1785 1615 1445	1550 1405 1255	1960 1770 1580	1700 1540 1370	440 400 360	2055 1865 1660	1780 1610 1440
1060 925 795	920 805 690	320 280 240	1145 1000 855	995 870 745	1275 1115 955	1110 970 830	1390 1220 1045	1210 1060 910	320 280 240	1460 1280 1095	1270 1110 950
660 530	575 460	200 160	715 570	620 495	795 635	690 550	870 695	755 605	200 160	915 730	795 635

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.57 STAT. (3.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.98 STAT. (3.46 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.35 STAT. (3.78 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
	SEE COLUMN II SEE COLUMN II					25000 20000	2700 2700	46 46	RUN RUN	96 93	370 349	322 303	2500 2500	43.5 43.5	RUN RUN	89 84	356 335	309 291	2250 2150	F.T. 37.5	RUN RUN	72 70	313 304	272 264	25000 20000	2200	F.T.	RUN	61	280	243
2700	46	RUN	103	352	306	15000	2600	44	RUN	95	343	298	2400	F.T.	RUN	81	322	280	2150	F.T.	RUN	66	291	253	15000	2000	F.T.	RUN	59	271	236
2700 2700 2700	46 46 46	RUN RUN RUN	98 91 86	327 308 288	284 268 250	10000 5000 S.L.	2550 2550 2550	44 44 44	RUN RUN RUN	89 82 78	317 298 278	276 259 242	2250 2250 2250	40.5 40.5 40.5	RUN RUN RUN	74 69 65	297 278 260	258 242 226	1950 1950 1950	37.5 37.5 37.5	RUN RUN RUN	62 58 54	272 254 235	236 221 204	10000 5000 S.L.	1800 1650 1600	36 34.5 34	RUN RUN RUN	56 49 46	253 225 210	220 195 182

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAX. FUEL CAPACITY WITH 2-110 GAL. WING TANKS, ST'D. WING TANKS & FUSELAGE TANKS.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 280 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 1270 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 1950 RPM AND 37.5 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN- WHEN WEIGHT REACHES 10,300 LBS. USE POWER SETTING SHEET 2, COLUMN IV.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-24-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 55 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

AAFHC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,300 TO 8,100 POUNDS

EXTERNAL LOAD ITEMS
TWO 1000# BOMBS
OR ONE 1000# BOMBS + ONE 110 GAL. W. TANK
OR TWO 110 GAL. WING TANKS
(OR TEN 5" ROCKETS)

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND). TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I			FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V				
RANGE IN AIRMILES			U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES				
STATUTE		NAUTICAL	GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL		
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																											
1330		1155	400	1505		1310				1700		1480				1895		1650				400	1980		1720		
1195		1040	360	1355		1180				1530		1330				1705		1480				360	1780		1545		
1060		920	320	1205		1045				1360		1180				1515		1315				320	1585		1380		
930		810	280	1050		910				1190		1035				1325		1150				280	1385		1205		
795		690	240	900		780				1020		885				1135		985				240	1190		1035		
665		580	200	750		650				850		740				945		820				200	990		860		
530		460	160	600		520				680		590				755		655				160	790		685		
400		350	120	450		390				510		445				565		490				120	595		515		
265		230	80	300		260				340		295				380		330				80	395		345		
135		115	40	150		130				170		150				190		165				40	200		175		
MAXIMUM CONTINUOUS			PRESS ALT. FEET	(3.76 STAT. (3.27 NAUT.) MI./GAL.)						(4.25 STAT. (3.69 NAUT.) MI./GAL.)						(4.73 STAT. (4.11 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE				
R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																							
						35000																							
	SEE COLUMN II					30000	2700	F.T.	RUN	96	383	333	2600	F.T.	RUN	87	368	320	2350	F.T.	RUN	69	330	287						
	SEE COLUMN II					25000	2700	46	RUN	98	372	323	2400	F.T.	RUN	82	349	303	2200	F.T.	RUN	67	318	276	2050	F.T.	RUN	58	290	252
	SEE COLUMN II					20000	2650	45.5	RUN	91	347	302	2300	40.5	RUN	77	325	282	2000	33.5	RUN	61	296	257	2100	F.T.	RUN	57	283	246
2700	46	RUN	103	351	305	15000	2500	F.T.	RUN	89	335	291	2300	F.T.	RUN	73	311	270	2000	F.T.	RUN	58	279	242	1850	F.T.	RUN	53	261	227
2700	46	RUN	98	330	287	10000	2400	42	RUN	81	310	269	2150	39	RUN	68	288	250	1750	35.5	RUN	54	259	234	1600	32.5	RUN	48	239	208
2700	46	RUN	91	308	268	5000	2400	42	RUN	75	288	250	2100	39	RUN	65	267	232	1700	35	RUN	50	239	208	1600	30.5	RUN	44	215	187
2700	46	RUN	86	289	251	S.L.	2400	42	RUN	71	268	233	2050	38.5	RUN	57	246	214	1600	33.5	RUN	45	214	186		(SEE COLUMN IV)				

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 120 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 565 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 1700 RPM AND 35 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 55 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

Figures 56-63, pages 61-74, deleted in revision, dated 7 May 1947

AREMC-527
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODEL(S)
V-1650-3

TAKE-OFF DISTANCE FEET

GROSS WEIGHT LB.	HEAD WIND		HARD SURFACE RUNWAY						SOD-TURF RUNWAY						SOFT SURFACE RUNWAY					
			AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET	
	M.P.H.	KTS.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.
9000	0	0	1350	2000	1500	2200	1700	2450	1450	2100	1600	2250	1800	2500	1600	2250	1750	2450	2000	2750
	17	15	1000	1550	1150	1700	1300	1950	1050	1600	1200	1800	1350	2000	1200	1750	1350	1800	1500	2200
	34	30	750	1150	800	1300	950	1500	750	1200	850	1350	1000	1550	850	1300	950	1400	1100	1650
	51	45	500	850	550	950	650	1100	500	850	600	1000	700	1150	550	900	600	1050	750	1200
11,000	0	0	1850	2700	2000	2950	2250	3300	1950	2800	2100	3050	2400	3400	2250	3150	2400	3400	2800	3800
	17	15	1350	2150	1500	2300	1750	2650	1450	2200	1600	2400	1850	2700	1700	2450	1900	2700	2150	3100
	34	30	950	1600	1100	1750	1300	2050	1050	1650	1200	1850	1400	2100	1200	1850	1400	2050	1600	2300
	51	45	650	1150	750	1250	900	1500	700	1200	800	1350	950	1550	800	1250	950	1500	1150	1750
13,000	0	0	2300	3600	2500	3800	2800	4300	2450	3700	2650	3950	3000	4550	2900	4300	3200	4800	3600	5300
	17	15	1700	2800	1900	3050	2200	3400	1850	2900	2050	3200	2350	3600	2200	3300	2400	3700	2800	4200
	34	30	1200	2050	1400	2300	1650	2700	1350	2150	1500	2400	1750	2850	1600	2450	1800	2850	2100	3200
	51	45	850	1550	1000	1750	1200	2100	900	1600	1050	1800	1300	2250	1100	1700	1300	2100	1550	2700

NOTE: INCREASE CHART DISTANCES AS FOLLOWS: 75°F + 10%; 100°F + 20%; 125°F + 30%; 150°F + 40%

OPTIMUM TAKE-OFF WITH 3000 RPM, 61 IN.HG. & 20 DEG. FLAP IS 80% OF CHART VALUES

DATA AS OF 5-8-45 BASED ON: FLIGHT TESTS

CLIMB DATA

GROSS WEIGHT LB.	AT SEA LEVEL				AT 5000 FEET					AT 10,000 FEET					AT 15,000 FEET					AT 20,000 FEET					AT 25,000 FEET				
	BEST I.A.S.		RATE OF CLIMB F.P.M.	GAL. OF FUEL USED	BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL	
	MPH	KTS			MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED
9000	170	145	2200	15	170	145	2200	2.5	19	170	145	2250	5.0	23	170	145	2250	7.5	27	165	145	1900	10.0	31	160	140	1650	13.0	35
11,000	170	145	1500	15	170	145	1500	3.5	20	170	145	1500	7.0	26	170	145	1500	10.5	32	165	145	1150	14.0	39	160	140	900	19.0	47
13,000	175	150	1000	15	175	150	950	5.5	23	175	150	900	11.0	32	175	150	850	17.0	42	170	145	550	23.0	55	165	145	300	37.0	75

POWER PLANT SETTINGS: (DETAILS ON FIG. SECTION III):

DATA AS OF 5-8-45 BASED ON: FLIGHT TESTS

FUEL USED (U.S. GAL.) INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

LANDING DISTANCE FEET

GROSS WEIGHT LB.	BEST IAS APPROACH				HARD DRY SURFACE						FIRM DRY SOD						WET OR SLIPPERY					
	POWER OFF		POWER ON		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET	
	MPH	KTS	MPH	KTS	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.
9000	130	115	130	115	1200	2300	1400	2400	1500	2600	1400	2400	1600	2600	1700	2800	3200	4300	3500	4600	3900	5000
8000	130	115	130	115	1100	2100	1200	2200	1400	2400	1300	2200	1400	2400	1500	2600	2900	3800	3100	4100	3400	4500

DATA AS OF 5-8-45 BASED ON FLIGHT TESTS

OPTIMUM LANDING IS 80% OF CHART VALUES

REMARKS:

NOTE: TO DETERMINE FUEL CONSUMPTION IN BRITISH IMPERIAL GALLONS, MULTIPLY BY 10, THEN DIVIDE BY 12

MIXTURE: USE "RUN" OR "AUTO RICH - AUTO LEAN"

LEGEND

I.A.S. : INDICATED AIRSPEED
M.P.H. : MILES PER HOUR
KTS. : KNOTS
F.P.M. : FEET PER MINUTE

For use with V-1650-3 engine only regardless of airplane model.

Figure 64—Take-off, Climb and Landing Chart

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,000 TO 8500 POUNDS

EXTERNAL LOAD ITEMS
WING RACKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 158	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[2] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I		FUEL	COLUMN II		COLUMN III		COLUMN IV		FUEL	COLUMN V	
RANGE IN AIRMILES		U.S.	RANGE IN AIRMILES		RANGE IN AIRMILES		RANGE IN AIRMILES		U.S.	RANGE IN AIRMILES	
STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	GAL.	STATUTE	NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
860	750	269	1130	980	1340	1170	1560	1340	269	1620	1410
770	670	240	1010	870	1200	1040	1380	1200	240	1450	1260
700	610	220	920	800	1100	950	1260	1100	220	1330	1150
640	560	200	840	730	1000	870	1150	1000	200	1210	1050
580	500	180	760	660	900	780	1030	900	180	1090	940
510	440	160	670	580	800	690	920	800	160	970	840
450	390	140	590	510	700	610	800	700	140	850	730
380	330	120	500	440	600	520	690	600	120	730	630
320	280	100	420	360	500	430	570	500	100	600	520
260	220	80	340	290	400	350	460	400	80	480	420
190	170	60	250	220	300	260	340	300	60	360	310
130	110	40	170	150	200	170	230	200	40	240	210

MAXIMUM CONTINUOUS						PRESS ALT. FEET	(4.2 STAT. (3.65 NAUT.) MI./GAL.)						(5.0 STAT. (4.35 NAUT.) MI./GAL.)						(5.75 STAT. (5.0 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
2700	F.T.	RUN	90	420	365	40000																			40000						
2700	46	RUN	100	425	370	35000							2600	F.T.	RUN	80	405	350							35000						
						30000							2350	F.T.	RUN	79	395	345							30000						
2700	46	RUN	96	395	345	25000	2600	45	RUN	83	395	345	2200	39	RUN	75	370	320	2000	37	RUN	56	320	280	25000						
2700	46	RUN	119	405	350	20000	2450	F.T.	RUN	90	380	330	2300	F.T.	RUN	72	355	310	2050	F.T.	RUN	55	315	275	20000	1900	F.T.	RUN	48	280	245
2700	46	RUN	115	380	330	15000	2300	41	RUN	86	360	310	2100	F.T.	RUN	68	335	290	1900	F.T.	RUN	53	300	260	15000	1700	F.T.	RUN	45	270	235
2700	46	RUN	110	360	310	10000	2300	41	RUN	80	335	290	2050	39	RUN	63	315	275	1750	35	RUN	50	285	245	10000	1600	31	RUN	44	260	225
2700	46	RUN	106	340	295	5000	2300	41	RUN	75	315	275	2050	39	RUN	59	295	255	1700	35	RUN	47	265	220	5000	1600	31	RUN	41	245	215
2700	46	RUN	101	320	280	S.L.	2300	41	RUN	73	300	260	2050	39	RUN	57	280	245	1700	35	RUN	44	250	215	S.L.	1600	31	RUN	38	230	200

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL
(AFTER DEDUCTING TOTAL ALLOWANCES OF [illegible] GAL.)
TO FLY 1280 STAT. AIRMILES AT 25,000 FT. ALTITUDE
MAINTAIN 2000 RPM AND 32 IN. MANIFOLD PRESSURE
WITH MIXTURE SET: [illegible]

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 65—Flight Operation Instruction Chart—No External Load

AAFMC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 10,000 POUNDS

EXTERNAL LOAD ITEMS
2 - 500-POUND WING BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT.III)
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

For use with V-1650-3 engine only regardless of airplane model.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
790	680	269	1000	870	1200	1040	1380	1190	269	1440	1250
700	610	240	900	780	1070	930	1230	1060	240	1290	1120
640 590	560 510	220 200	830 750	720 650	980 900	850 770	1130 1020	980 890	220 200	1190 1080	1020 930
530 470	460 410	180 160	680 610	590 530	810 720	700 620	920 820	800 710	180 160	980 870	840 750

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.6 STAT. (3.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	(4.4 STAT. (3.80 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	(5.1 STAT. (4.45 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	360	310	25000							2200	39	RUN	76	325	280							25000							
2700 2700	46 46	RUN RUN	119 115	370 350	320 305	20000 15000	2550 2400	F.T. 42	RUN RUN	99 94	355 335	310 290	2300 2150	F.T. F.T.	RUN RUN	74 70	325 310	280 270	2050 1900	F.T. F.T.	RUN RUN	55 54	275 270	240 235	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	330 310 295	285 270 255	10000 5000 S.L.	2350 2350 2350	42 41 41	RUN RUN RUN	87 82 78	315 295 280	275 255 245	2100 2100 2100	39 39 39	RUN RUN RUN	65 63 60	290 275 260	250 240 225	1750 1750 1750	35 35 36	RUN RUN RUN	50 48 45	255 240 230	220 210 200	10000 5000 S.L.	1600 1600 1600	33 33 33	RUN RUN RUN	45 43 41	235 225 215	205 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 100 GAL.) TO FLY 1100 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2050 RPM AND F. T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 66 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 500-pound Bombs

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,400 TO 9400 POUNDS

EXTERNAL LOAD ITEMS
2 - 500-LB. WING BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RICH	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 158

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
540 470 410	*470* *410* *360*	184 160 140	700 610 530	*610* *530* *460*	830 720 630	*720* *620* *540*	950 820 720	*820* *710* *630*	184 160 140	1000 870 760	*860* *750* *660*
350 290 230	*300* *250* *200*	120 100 80	460 380 300	*400* *330* *260*	540 450 360	*470* *390* *310*	620 510 410	*540* *450* *360*	120 100 80	650 540 430	*560* *470* *380*
180 120 60	*150* *100* *50*	60 40 20	230 150 80	*200* *130* *70*	270 180 90	*230* *160* *80*	310 210 100	*270* *180* *90*	60 40 20	320 220 110	*280* *190* *90*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.8 STAT. (3.3 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.5 STAT. (3.9 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.1 STAT. (4.4 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	365	315	25000	2600	45	RUN	92	360	310	2200	39	RUN	75	335	290							25000							
2700 2700	46 46	RUN RUN	119 115	370 350	320 305	20000 15000	2500 2300	F.T. 41	RUN RUN	93 84	350 325	305 280	2300 2100	F.T. F.T.	RUN RUN	73 68	330 305	285 265	2100 1900	F.T. F.T.	RUN RUN	57 54	290 275	250 .240	20000 15000								
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	330 310 295	285 270 255	10000 5000 S.L.	2300 2300 2300	41 41 41	RUN RUN RUN	82 77 73	310 290 275	270 250 240	2100 2050 2050	39 39 39	RUN RUN RUN	64 60 57	290 270 255	250 235 220	1750 1750 1750	36 36 36	RUN RUN RUN	51 48 45	260 245 230	225 210 200	10000 5000 S.L.	1600 1600 1600	31 31 30	RUN RUN RUN	42 41 39	230 220 210	200 190 180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 140 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 44 GAL.) TO FLY 700 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 66 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 500-pound Bombs

AAFMC-528 6-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,000 TO 11,400 POUNDS

EXTERNAL LOAD ITEMS
2 1000-POUND BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 188	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		187 158	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
770	670	269	960	830	1170	1010	1290	1120	269	1360	1180
690	600	240	860	750	1040	900	1160	1010	240	1210	1050
630 570	550 490	220 200	790 720	680 620	950 860	820 750	1060 970	920 840	220 200	1120 1020	970 880
520 460	450 380	180 160	650 580	560 500	770 680	670 590	870 780	750 680	180 160	920 820	800 710

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.5 STAT. (3.05 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	(4.1 STAT. (3.55 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	(4.7 STAT. (4.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	350	305	25000							2400	41	RUN	81	330	285							25000							
2700 2700	46 46	RUN RUN	119 115	365 345	315 300	20000 15000	2550 2400	F.T. 42	RUN RUN	100 95	350 330	305 285	2350 2200	F.T. 40	RUN RUN	79 76	325 310	280 270	2150 2000	F.T. F.T.	RUN RUN	61 60	285 280	245 245	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	325 310 290	280 270 250	10000 5000 S.L.	2400 2400 2350	42 42 42	RUN RUN RUN	89 85 78	310 295 275	270 255 240	2200 2150 2150	40 40 40	RUN RUN RUN	73 66 63	295 275 260	255 240 225	1950 1950 1950	38 38 37	RUN RUN RUN	58 55 52	270 255 240	235 220 210	10000 5000 S.L.	1750 1750 1750	35 35 36	RUN RUN RUN	50 48 47	245 235 225	215 205 195

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 12,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 1050 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 67 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 1000-pound Bombs

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,400 TO 10,400 POUNDS

EXTERNAL LOAD ITEMS
2 - 1000-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGHH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
530	440	184	660	570	780	680	900	780	184	940	810
460 400	380 340	160 140	580 500	500 440	680 590	590 520	780 690	680 590	160 140	820 710	710 620
340 290 230	290 240 190	120 100 80	430 360 290	370 310 250	510 420 340	440 370 300	590 490 390	510 420 340	120 100 80	610 510 410	530 440 350
170 110 60	140 100 50	60 40 20	220 140 70	190 120 60	250 170 80	220 150 70	290 200 100	250 170 80	60 40 20	310 200 100	260 180 90

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(4.25 STAT. (3.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(4.9 STAT. (4.25 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	355	310	25000							2250	40	RUN	78	330	285							25000							
2700 2700	46 46	RUN RUN	119 115	365 345	315 300	20000 15000	2500 2350	F.T. 41	RUN RUN	95 90	345 325	300 280	2350 2200	F.T. F.T.	RUN RUN	77 74	325 310	280 270	2100 1950	F.T. F.T.	RUN RUN	58 56	280 270	245 235	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	325 305 290	280 265 250	10000 5000 S.L.	2350 2350 2350	41 41 41	RUN RUN RUN	84 81 77	305 290 275	265 250 240	2150 2150 2150	40 40 40	RUN RUN RUN	70 67 62	290 275 260	250 240 225	1850 1850 1850	36 36 37	RUN RUN RUN	54 51 49	260 245 235	225 210 205	10000 5000 S.L.	1600 1600 1600	F.T. 34 34	RUN RUN RUN	48 44 42	235 225 215	205 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 140 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 44 GAL.) TO FLY 650 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S.GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

Figure 67 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 1000-pound Bombs

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-526 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 10,000 POUNDS

EXTERNAL LOAD ITEMS
2 - 75-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
					SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						
1220 1170	*1060* *1010*	419 400	1530 1460	*1330* *1270*	1870 1790	*1620* *1540*	2190 2090	*1900* *1820*	419 400	2270 2170	*1970* *1880*
1110 1050 990	*960* *910* *860*	380 360 340	1390 1320 1250	*1200* *1140* *1080*	1700 1610 1520	*1470* *1390* *1320*	1990 1890 1790	*1730* *1640* *1550*	380 360 340	2060 1960 1850	*1790* *1700* *1610*
930 880 820	*710* *760* *710*	320 300 280	1180 1100 1030	*1020* *950* *890*	1430 1350 1260	*1240* *1160* *1090*	1690 1580 1480	*1460* *1380* *1290*	320 300 280	1750 1640 1540	*1510* *1420* *1330*
760	*660*	260	960	*830*	1170	*1010*	1380	*1200*	260	1430	*1240*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(6.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(4.4 STAT. (3.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(5.1 STAT. (4.4 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	100	385	335								2400	F.T.	RUN	81	355	310														
2700	46	RUN	96	360	310	25000							2200	39	RUN	76	335	290							25000							
2700	46	RUN	119	370	320	20000	2550	F.T.	RUN	99	355	310	2300	F.T.	RUN	74	325	280	2050	F.T.	RUN	55	275	240	20000							
2700	46	RUN	115	350	305	15000	2400	42	RUN	94	335	290	2150	F.T.	RUN	70	310	270	1900	F.T.	RUN	54	270	235	15000							
2700	46	RUN	110	330	285	10000	2350	42	RUN	87	315	275	2100	39	RUN	65	290	250	1750	35	RUN	50	255	220	10000	1600	33	RUN	41	235	205
2700	46	RUN	106	310	270	5000	2350	41	RUN	82	295	255	2100	39	RUN	63	275	240	1750	35	RUN	48	240	210	5000	1600	33	RUN	43	225	195
2700	46	RUN	101	295	255	S.L.	2350	41	RUN	78	280	245	2100	39	RUN	60	260	225	1750	36	RUN	45	230	200	S.L.	1600	33	RUN	45	215	185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 300 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 50 GAL.) TO FLY 1800 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2050 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD-PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 68 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 75-gallon Tanks

AAFMC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,000 TO 8600 POUNDS

EXTERNAL LOAD ITEMS
2 - 75-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																															
790		*690*				269	990		*860*				1210		*1050*				1420		*1240*				269	1480		*1290*			
710		*610*				240	890		*770*				1080		*940*				1270		*1100*				240	1320		*1150*			
650		*560*				220	810		*710*				990		*860*				1160		*1010*				220	1210		*1050*			
590		*510*				200	740		*640*				900		*780*				1060		*920*				200	1100		*960*			
530		*460*				180	670		*580*				810		*700*				950		*830*				180	990		*860*			
470		*410*				160	590		*510*				720		*620*				850		*740*				160	880		*770*			
410		*360*				140	520		*450*				630		*550*				740		*640*				140	770		*670*			
350		*310*				120	440		*380*				540		*470*				640		*550*				120	660		*570*			
290		*250*				100	370		*320*				450		*390*				530		*460*				100	550		*480*			
240		*200*				80	300		*260*				360		*310*				420		*370*				80	440		*380*			
180		*150*				60	220		*190*				270		*230*				320		*280*				60	330		*290*			
120		*100*				40	150		*130*				180		*160*				210		*180*				40	220		*190*			
MAXIMUM CONTINUOUS						PRESS	(3.7 STAT. (3.2 NAUT.) MI./GAL.)						(4.5 STAT. (3.9 NAUT.) MI./GAL.)						(5.3 STAT. (4.6 NAUT.) MI./GAL.)						PRESS	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000						
						35000																			35000						
2700	F.T.	RUN	90	380	330	30000							2350	F.T.	RUN	80	360	310							30000						
2700	46	RUN	100	385	335																										
2700	46	RUN	96	360	310	25000							2200	40	RUN	75	335	290	2150	F.T.	RUN	53	280	245	25000						
2700	46	RUN	119	370	320	20000	2500	F.T.	RUN	97	355	310	2300	F.T.	RUN	72	325	280	1950	F.T.	RUN	52	270	235	20000						
2700	46	RUN	115	350	305	15000	2350	41	RUN	90	330	285	2100	F.T.	RUN	68	305	265	1850	F.T.	RUN	51	265	230	15000						
2700	46	RUN	110	330	285	10000	2350	41	RUN	84	310	270	2100	39	RUN	65	290	250	1700	35	RUN	49	255	220	10000	1600	30	RUN	42	230	200
2700	46	RUN	106	310	270	5000	2350	41	RUN	82	295	255	2050	39	RUN	60	270	235	1650	35	RUN	47	240	210	5000	1600	30	RUN	40	220	190
2700	46	RUN	101	295	255	S.L.	2350	41	RUN	77	280	245	2050	39	RUN	56	255	220	1650	35	RUN	43	225	195	S.L.	1600	31	RUN	38	210	180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 10 GAL.) TO FLY 1150 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 1950 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT.	: PRESSURE ALTITUDE	F.R.	: FULL RICH
M.P.	: MANIFOLD PRESSURE	A.R.	: AUTO-RICH
GPH	: U.S. GAL. PER HOUR	A.L.	: AUTO-LEAN
TAS	: TRUE AIRSPEED	C.L.	: CRUISING LEAN
KTS.	: KNOTS	M.L.	: MANUAL LEAN
S.L.	: SEA LEVEL	F.T.	: FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 68 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 75-gallon Tanks

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,600 TO 10,200 POUNDS

EXTERNAL LOAD ITEMS
2 - 110-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
					SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						
1410	*1220*	489	1740	*1510*	2100	*1820*	2450	*2120*	489	2540	*2210*
1330	*1150*	460	1640	*1420*	1980	*1720*	2310	*2000*	460	2400	*2090*
1270	*1100*	440	1570	*1360*	1900	*1640*	2210	*1920*	440	2300	*2000*
1210	*1050*	420	1500	*1300*	1810	*1570*	2120	*1840*	420	2200	*1910*
1150	*1000*	400	1430	*1240*	1730	*1500*	2020	*1750*	400	2100	*1830*
1100	*950*	380	1360	*1180*	1640	*1430*	1930	*1670*	380	2000	*1740*
1040	*900*	360	1290	*1110*	1560	*1350*	1830	*1590*	360	1900	*1650*
980	*850*	340	1220	*1050*	1480	*1280*	1730	*1500*	340	1800	*1570*
920	*800*	320	1150	*990*	1390	*1210*	1640	*1420*	320	1700	*1480*
870	*750*	300	1080	*930*	1310	*1140*	1540	*1340*	300	1600	*1390*
810	*700*	280	1010	*870*	1220	*1060*	1450	*1250*	280	1500	*1290*
750	*650*	260	940	*810*	1140	*990*	1350	*1170*	260	1400	*1220*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.5 STAT. (3.05 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	(4.2 STAT. (3.65 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.8 STAT. (4.15 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	100	375	325								2400	F.T.	RUN	83	345	300														
2700	46	RUN	96	355	310	25000							2350	41	RUN	81	335	290							25000							
2700	46	RUN	119	365	315	20000	2550	F.T.	RUN	98	350	305	2350	F.T.	RUN	77	325	280	2150	F.T.	RUN	62	290	250	20000							
2700	46	RUN	115	345	300	15000	2400	42	RUN	94	330	285	2200	F.T.	RUN	75	310	270	2000	F.T.	RUN	59	280	245	15000							
2700	46	RUN	110	325	280	10000	2400	42	RUN	93	315	275	2200	40	RUN	71	295	255	1900	37	RUN	56	265	230	10000	1700	35	RUN	50	245	210
2700	46	RUN	106	310	270	5000	2400	42	RUN	84	295	255	2100	40	RUN	65	275	240	1900	37	RUN	53	250	215	5000	1700	35	RUN	48	235	205
2700	46	RUN	101	295	255	S.L.	2400	42	RUN	80	280	245	2100	40	RUN	62	260	225	1950	37	RUN	52	240	210	S.L.	1750	36	RUN	45	225	195

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 440 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 2100 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 69 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 110-gallon Tanks

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,200 TO 9000 POUNDS

EXTERNAL LOAD ITEMS
2 - 110-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
770 690	670 600	269 240	970 860	840 750	1180 1050	1030 920	1400 1250	1210 1080	269 240	1450 1300	1260 1120
630 570 510	550 500 450	220 200 180	790 720 650	690 620 560	970 880 790	840 760 690	1140 1040 940	990 900 810	220 200 180	1190 1080 970	1030 940 840
460 400 340	400 350 300	160 140 120	580 500 430	500 440 370	700 620 530	610 530 460	830 730 620	720 630 540	160 140 120	860 760 650	750 660 560
290 230 170 110	250 200 150 100	100 80 60 40	360 290 220 140	310 250 190 120	440 360 260 180	380 310 230 150	520 420 310 210	450 360 270 180	100 80 60 40	540 430 320 220	470 370 280 190

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.4 STAT. (3.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.2 STAT. (4.5 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000							
2700	F.T.	RUN	90	375	325	35000																			35000							
2700	46	RUN	100	380	330	30000							2350	F.T.	RUN	79	360	305							30000							
2700	46	RUN	96	360	310	25000							2250	40	RUN	77	335	290	2150	F.T.	RUN	54	275	240	25000							
2700	46	RUN	119	365	315	20000	2550	F.T.	RUN	98	350	305	2300	F.T.	RUN	75	325	280	1950	F.T.	RUN	52	285	220	20000							
2700	46	RUN	115	345	300	15000	2400	42	RUN	94	330	285	2150	F.T.	RUN	70	305	265	1850	F.T.	RUN	51	260	225	15000							
2700	46	RUN	110	330	285	10000	2350	41	RUN	85	310	270	2100	39	RUN	67	290	250	1650	35	RUN	49	250	215	10000	1600	30	RUN	43	225	195
2700	46	RUN	106	310	270	5000	2350	41	RUN	80	290	250	2100	39	RUN	61	270	235	1650	34	RUN	46	235	205	5000	1600	30	RUN	40	215	185
2700	46	RUN	101	290	250	S.L.	2350	41	RUN	75	275	240	2100	39	RUN	58	255	220	1650	34	RUN	43	220	190	S.L.	1600	31	RUN	38	205	180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 30 GAL.) TO FLY 1100 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2350 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 69 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 110-gallon Tanks

AAFHC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,600 TO 9000 POUNDS

EXTERNAL LOAD ITEMS
10 ROCKETS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. 111)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND). [1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

For use with V-1650-3 engine only regardless of airplane model.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
MAXIMUM CONTINUOUS						PRESS ALT. FEET	(3.3 STAT. (2.85 NAUT.) MI./GAL.)						(4.0 STAT. (3.45 NAUT.) MI./GAL.)						(4.6 STAT. (4.00 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
							SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																								
740 660		650 580				269 240	890 790		770 680				1080 960		930 830				1230 1100		1080 960				269 240	1300 1160		1130 1010			
610 550 500		530 480 430				220 200 180	720 660 590		630 570 510				880 800 720		780 690 620				1010 920 830		880 800 720				220 200 180	1060 970 870		920 840 760			
440 390 330		380 340 290				160 140 120	530 460 400		460 400 340				640 560 480		550 490 420				740 640 550		640 560 480				160 140 120	770 680 580		670 590 500			
280 220 170 110		240 190 140 100				100 80 60 40	330 260 200 130		290 230 170 110				400 320 240 160		350 280 210 140				460 370 280 180		400 320 240 160				100 80 60 40	480 390 290 190		420 340 250 170			
2700 2700	F.T. 46	RUN RUN	90 100	345 360	300 310	40000 35000 30000							2400	F.T.	RUN	84	335	290							40000 35000 30000						
2700	46	RUN	96	340	295	25000							2300	41	RUN	81	320	280	2300	F.T.	RUN	63	285	250	25000						
2700 2700	46 46	RUN RUN	119 115	350 335	305 290	20000 15000	2550 2450	F.T. 42	RUN RUN	104 97	340 320	295 280	2350 2150	F.T. F.T.	RUN RUN	79 74	315 295	275 255	2150 2000	F.T. F.T.	RUN RUN	61 59	275 265	240 230	20000 15000						
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	315 300 280	275 260 245	10000 5000 S.L.	2400 2400 2400	42 42 42	RUN RUN RUN	90 86 82	300 285 270	260 245 235	2150 2150 2150	40 40 40	RUN RUN RUN	71 67 62	280 265 250	245 230 215	1900 1900 1900	37 37 37	RUN RUN RUN	56 53 51	255 240 230	220 210 200	10000 5000 S.L.	1650 1700 1750	F.T. 35 35	RUN RUN RUN	48 48 46	230 225 215	200 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 1000 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

Figure 70—Flight Operation Instruction Chart—10 Rockets

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-528
R-1-42

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,600 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 500-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND)[1]. TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
720	620	269	850	730	1010	880	1170	1050	269	1230	1060
640	560	240	760	650	910	790	1040	910	240	1100	950
590 540	510 460	220 200	700 630	600 550	830 760	720 660	960 870	830 760	220 200	1010 920	870 800
480 430	420 370	180 160	570 510	490 440	680 610	590 530	790 700	680 610	180 160	830 740	720 640

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (2.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.7 STAT. (3.2 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.3 STAT. (3.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	330	285	25000							2450	43	RUN	85	315	275							25000							
2700 2700	46 46	RUN RUN	119 115	345 325	300 280	20000 15000	2600 2500	F.T. 43	RUN RUN	107 103	335 320	290 280	2450 2250	F.T. 40	RUN RUN	85 81	315 300	275 260	2150 2050	F.T. F.T.	RUN RUN	63 63	270 270	235 235	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	305 290 275	265 250 240	10000 5000 S.L.	2500 2500 2500	43 43 43	RUN RUN RUN	98 94 90	300 285 270	260 245 235	2250 2250 2250	40 41 41	RUN RUN RUN	76 74 70	280 270 255	245 235 220	2000 2000 2000	38 38 38	RUN RUN RUN	59 58 54	255 245 230	220 210 200	10000 5000 S.L.	1800 1850 1900	36 36 37	RUN RUN RUN	53 52 50	235 230 220	205 200 190

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 950 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 71 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 500-pound Bombs

AAFMC-528
8-1-45

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 10,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 500-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	2800	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
490	430	184	590	510	700	610	810	700	184	850	740
430 370	370 320	160 140	510 450	440 390	610 530	530 460	700 620	610 530	160 140	740 650	640 560
320 270 210	280 230 190	120 100 80	380 320 250	330 280 220	460 380 300	400 330 260	530 440 350	460 380 310	120 100 80	560 460 370	480 400 320
160 110 50	140 90 50	60 40 20	190 130 60	170 110 60	230 150 80	200 130 70	260 180 90	230 150 80	60 40 20	280 190 90	240 160 80

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.2 STAT. (2.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.8 STAT. (3.3 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.4 STAT. (3.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	335	290	25000							2450	42	RUN	84	315	275							25000							
2700 2700	46 46	RUN RUN	119 115	345 325	300 280	20000 15000	2600 2450	F.T. 43	RUN RUN	105 99	335 315	290 275	2400 2250	F.T. 40	RUN RUN	83 80	315 300	275 260	2150 2000	F.T. F.T.	RUN RUN	61 60	270 265	235 230	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	310 290 275	270 250 240	10000 5000 S.L.	2400 2400 2400	42 42 42	RUN RUN RUN	91 87 83	295 280 265	255 245 230	2200 2200 2200	40 40 40	RUN RUN RUN	74 70 65	280 265 250	245 230 215	1950 1950 2000	37 37 38	RUN RUN RUN	58 55 53	255 240 230	220 210 200	10000 5000 S.L.	1750 1800 1800	35 36 36	RUN RUN RUN	51 50 48	230 225 215	200 195 185

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 140 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 44 GAL.) TO FLY 600 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

Figure 71 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 500-pound Bombs

AAFHC-528 6-1-45

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,600 TO 12,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS PLUS 2 - 1000-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 152

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
710	620	269	830	710	960	830	1090	940	269	1130	980
830	550	240	740	640	860	740	980	840	240	1010	880
580 530	510 460	220 200	680 620	590 530	790 720	680 620	900 820	780 710	220 200	930 850	810 730
470 420	420 370	180 160	560 500	480 430	650 580	560 500	740 660	640 570	180 160	760 680	660 590

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.0 STAT. (2.6 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.5 STAT. (3.05 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.95 STAT. (3.45 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
2700	46	RUN	96	310	270	25000																			25000						
2700 2700	46 46	RUN RUN	119 115	330 315	285 275	20000 15000	2600 2450	F.T. 43	RUN RUN	105 100	320 305	280 265	2450 2250	F.T. 41	RUN RUN	86 81	300 285	260 245	2100	F.T.	RUN	67	260	225	20000 15000						
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	300 285 270	260 245 235	10000 5000 S.L.	2500 2500 2500	43 43 43	RUN RUN RUN	98 94 88	290 275 260	250 240 225	2300 2300 2250	41 41 41	RUN RUN RUN	80 76 70	275 260 245	240 225 215	2100 2100 2100	39 39 39	RUN RUN RUN	63 62 59	250 240 230	215 210 200	10000 5000 S.L.	1950 1950 1950	38 38 38	RUN RUN RUN	58 56 53	235 225 215	205 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 12,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 900 STAT. AIRMILES AT 15,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 72 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 1000-pound Bombs

AAFMC-528 X-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,000 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 1000-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	FOR DETAILS SEE POWER PLANT CHART (FIG.) SECT. ( )
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
490	420	184	570	490	660	570	750	650	184	780	680
420 370	370 320	160 140	500 430	430 380	580 500	500 440	660 570	570 500	160 140	680 590	590 520
320 260 210	280 230 180	120 100 80	370 310 250	320 270 220	430 360 290	370 310 250	490 410 330	430 360 280	120 100 80	510 420 340	440 370 290
160 110 50	140 90 50	60 40 20	190 120 60	160 110 50	220 140 70	190 120 60	250 160 80	210 140 70	60 40 20	250 170 80	220 150 70

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (2.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	(4.1 STAT. (3.55 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	315	275	25000							2350	41	RUN	82	290	250							25000							
2700 2700	46 46	RUN RUN	119 115	335 315	290 275	20000 15000	2550 2450	F.T. 43	RUN RUN	103 99	320 305	280 265	2400 2250	F.T. 40	RUN RUN	84 79	300 285	260 245	2050	F.T.	RUN	63	255	220	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	300 285 270	260 245 235	10000 5000 S.L.	2450 2450 2450	43 43 43	RUN RUN RUN	95 91 84	290 275 260	250 240 225	2250 2250 2250	40 40 40	RUN RUN RUN	77 73 68	275 260 245	240 225 215	2050 2050 2050	38 38 38	RUN RUN RUN	61 59 55	250 240 225	215 210 195	10000 5000 S.L.	1900 1900 1900	37 37 37	RUN RUN RUN	55 54 51	230 225 215	200 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 140 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 44 GAL.) TO FLY 550 STAT. AIRMILES AT 15,000 FT. ALTITUDE MAINTAIN 2050 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: [redacted]

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 72 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 1000-pound Bombs

AAFMC-528 4-1-45

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,600 TO 10,600 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 75-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
1140	*990*	419	1320	*1150*	1600	*1390*	1850	*1600*	419	1940	*1690*
1090 1030	*950* *900*	400 380	1260 1200	*1100* *1040*	1530 1450	*1330* *1260*	1770 1690	*1530* *1460*	400 380	1860 1770	*1620* *1540*
980 920 870	*850* *810* *760*	360 340 320	1140 1080 1020	*990* *930* *880*	1380 1310 1230	*1200* *1140* *1070*	1600 1510 1430	*1380* *1310* *1230*	360 340 320	1680 1590 1500	*1460* *1380* *1300*
820 760 710	*710* *670* *620*	300 280 260	950 890 830	*830* *770* *720*	1160 1080 1010	*1010* *940* *880*	1340 1260 1170	*1160* *1080* *1010*	300 280 260	1410 1320 1230	*1230* *1150* *1070*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (2.70 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	(3.7 STAT. (3.2 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	(4.3 STAT. (3.75 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
2700	46	RUN	100	345	300	40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	330	285	25000							2450	43	RUN	85	315	275							25000							
2700	46	RUN	119	345	300	20000	2600	F.T.	RUN	107	335	290	2450	F.T.	RUN	85	315	275	2150	F.T.	RUN	63	270	235	20000							
2700	46	RUN	115	325	280	15000	2500	43	RUN	103	320	280	2250	40	RUN	81	300	260	2050	F.T.	RUN	63	270	235	15000							
2700	46	RUN	110	305	265	10000	2500	43	RUN	98	300	260	2250	40	RUN	76	280	245	2000	38	RUN	59	255	220	10000	1800	36	RUN	53	235	205
2700	46	RUN	106	290	250	5000	2500	43	RUN	94	285	245	2250	41	RUN	74	270	235	2000	38	RUN	58	245	210	5000	1850	36	RUN	52	230	200
2700	46	RUN	101	275	240	S.L.	2500	43	RUN	90	270	235	2250	41	RUN	70	255	220	2000	38	RUN	54	230	200	S.L.	1900	37	RUN	50	220	190

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 360 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 50 GAL.) TO FLY 1600 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 73 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 75-gallon Tanks

AAFMC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,600 TO 9200 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 75-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
					SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						
740 660	640 570	269 240	860 770	750 670	1040 940	910 810	1200 1080	1040 940	269 240	1280 1140	1100 990
600 550 490	520 480 430	220 200 180	700 640 580	610 560 500	860 780 700	740 680 610	990 900 810	860 780 700	220 200 180	1040 950 850	910 820 740
440 380 330	380 330 280	160 140 120	510 450 380	440 390 330	620 550 470	540 470 410	770 630 540	620 550 470	160 140 120	760 660 570	660 580 490
270 220 160 110	240 190 140 100	100 80 60 40	320 260 190 130	280 220 170 110	390 310 230 160	340 270 200 140	450 360 270 180	390 310 230 160	100 80 60 40	470 380 280 190	410 330 250 160

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.2 STAT. (2.75 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(3.9 STAT. (3.4 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(4.5 STAT. (3.9 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	100	350	305								2400	F.T.	RUN	84	330	285														
2700	46	RUN	96	330	285	25000							2350	41	RUN	81	315	275							25000							
2700 2700	46 46	RUN RUN	119 115	345 325	300 280	20000 15000	2600 2450	F.T. 43	RUN RUN	105 98	335 315	290 275	2350 2200	F.T. 40	RUN RUN	79 76	310 295	270 255	2300 2150 2000	F.T. F.T. F.T.	RUN RUN RUN	63 61 61	280 275 270	245 240 235	20000 15000	1850	F.T.	RUN	52	240	210
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	310 290 275	270 250 240	10000 5000 S.L.	2450 2400 2400	43 42 42	RUN RUN RUN	95 88 83	300 280 265	260 245 230	2200 2200 2200	40 40 40	RUN RUN RUN	73 69 64	280 265 250	245 210 215	1950 1950 1950	37 37 38	RUN RUN RUN	58 54 53	255 240 230	220 210 200	10000 5000 S.L.	1700 1700 1700	35 35 35	RUN RUN RUN	49 47 44	230 220 210	200 190 180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 1000 STAT. AIRMILES AT 25,000 FT. ALTITUDE MAINTAIN 2000 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 73 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 75-gallon Tanks

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-528 5-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,200 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 110-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[2]											
1300	*1130*	489	1520	*1320*	1760	*1520*	2010	*1740*	489	2100	*1820*
1220	*1060*	460	1430	*1240*	1660	*1430*	1890	*1640*	460	1980	*1720*
1170	*1010*	440	1370	*1180*	1590	*1370*	1810	*1570*	440	1890	*1640*
1110	*970*	420	1310	*1130*	1520	*1310*	1730	*1500*	420	1810	*1570*
1010	*880*	380	1180	*1020*	1440	*1250*	1640	*1430*	400	1780	*1490*
950	*830*	360	1120	*970*	1370	*1180*	1560	*1360*	380	1640	*1420*
900	*780*	340	1060	*920*	1300	*1120*	1480	*1290*	360	1550	*1340*
850	*740*	320	1000	*860*	1230	*1060*	1400	*1210*	340	1460	*1270*
800	*690*	300	930	*810*	1160	*1000*	1320	*1140*	320	1380	*1190*
740	*650*	280	870	*750*	1080	*930*	1230	*1070*	300	1290	*1120*
690	*600*	260	810	*700*	1010	*870*	1150	*1000*	280	1210	*1040*
					940	*810*	1070	*930*	260	1120	*970*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (6.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.1 STAT. 6.55 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	TOT. GPH.	MPH.	KTS.
						40000																			40000						
						35000																			35000						
2700	46	RUN	100	335	290	30000																			30000						
2700	46	RUN	96	320	280	25000							2400	42	RUN	83	300	260							25000						
2700	46	RUN	119	340	295	20000	2600	F.T.	RUN	106	330	285	2450	F.T.	RUN	86	310	270	2250	F.T.	RUN	68	270	235	20000						
2700	46	RUN	115	320	280	15000	2450	43	RUN	100	310	270	2250	41	RUN	82	295	255	2100	F.T.	RUN	64	265	230	15000						
2700	46	RUN	110	305	265	10000	2400	43	RUN	96	295	255	2300	41	RUN	79	280	245	2050	39	RUN	62	255	220	10000	1900	37	RUN	56	235	205
2700	46	RUN	106	290	250	5000	2450	43	RUN	92	280	245	2250	41	RUN	74	265	230	2050	39	RUN	60	245	215	5000	1950	37	RUN	54	230	200
2700	46	RUN	101	275	240	S.L.	2450	43	RUN	86	265	230	2250	41	RUN	70	250	215	2050	39	RUN	56	230	200	S.L.	1950	37	RUN	52	220	190

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 12,000 LB. GROSS WEIGHT WITH [illegible] GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF [illegible] GAL.) TO FLY [illegible] STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2250 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: [illegible]

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

Figure 74 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 110-gallon Tanks

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 9500 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 110-GALLON
COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
							SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																								
710		620				269	860		750				1020		890				1180		1030				269	1220		1060			
640		550				240	770		670				910		790				1050		920				240	1080		950			
580		510				220	700		610				840		690				970		840				220	1000		870			
530		460				200	640		560				760		660				880		760				200	910		790			
480		410				180	580		500				680		590				790		690				180	820		710			
420		370				160	510		440				610		530				700		610				160	730		630			
370		320				140	450		390				530		460				620		530				140	640		550			
320		280				120	380		330				460		400				530		460				120	550		470			
260		230				100	320		280				380		330				440		380				100	450		390			
210		180				80	260		220				300		260				350		310				80	360		320			
160		140				60	190		170				230		200				260		230				60	270		240			
110		90				40	130		110				150		130				180		150				40	180		160			
MAXIMUM CONTINUOUS						PRESS	(3.2 STAT. (2.8 NAUT.) MI./GAL.)						(3.8 STAT. (3.3 NAUT.) MI./GAL.)						(4.4 STAT. (3.8 NAUT.) MI./GAL.)						PRESS	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
						40000																			40000						
						35000																			35000						
2700	46	RUN	100	345	300	30000							2400	F.T.	RUN	84	320	280							30000						
2700	46	RUN	96	330	285	25000							2400	42	RUN	83	310	270							25000						
2700	46	RUN	119	340	295	20000	2550	F.T.	RUN	104	330	285	2400	F.T.	RUN	80	305	265	2150	F.T.	RUN	61	265	230	20000						
2700	46	RUN	115	320	280	15000	2450	42	RUN	97	310	270	2200	40	RUN	76	290	250	2000	F.T.	RUN	58	255	220	15000						
2700	46	RUN	110	305	265	10000	2450	42	RUN	94	295	255	2200	40	RUN	73	275	240	1900	37	RUN	56	245	215	10000	1800	36	RUN	52	230	200
2700	46	RUN	106	290	250	5000	2400	42	RUN	85	275	240	2200	40	RUN	69	260	225	1950	37	RUN	54	235	205	5000	1800	36	RUN	50	225	195
2700	46	RUN	101	275	240	S.L.	2400	42	RUN	80	260	225	2200	40	RUN	64	245	215	1950	37	RUN	52	225	195	S.L.	1850	36	RUN	48	215	185

For use with V-1650-3 engine only regardless of airplane model.

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 950 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 74 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 110-gallon Tanks

AAFRC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,900 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
1 - 110-GALLON COMBAT TANK
AND 1 - 1000-LB. BOMB

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
1080	*940*	379	1320	*1140*	1580	*1370*	1830	*1590*	379	1930	*1670*
1030 970	*890* *840*	360 340	1250 1190	*1080* *1030*	1500 1420	*1300* *1230*	1740 1650	*1510* *1430*	360 340	1840 1740	*1590* *1510*
910 850	*790* *740*	320 300	1120 1050	*970* *910*	1350 1250	*1170* *1080*	1550 1460	*1340* *1270*	320 300	1640 1540	*1420* *1330*
800 740	*690* *640*	280 260	980 910	*850* *790*	1170 1090	*1010* *950*	1360 1270	*1180* *1100*	280 260	1440 1340	*1250* *1160*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.45 STAT. (3.0 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	(4.1 STAT. (3.56 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	(4.75 STAT. (4.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	350	305	25000							2400	42	RUN	83	335	290							25000							
2700 2700	46 46	RUN RUN	119 115	365 345	315 300	20000 15000	2550 2450	F.T. 43	RUN RUN	101 99	350 335	305 290	2400 2200	F.T. F.T.	RUN RUN	81 75	330 310	285 270	2100 2000	F.T. F.T.	RUN RUN	60 59	280 275	245 240	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	325 310 290	280 270 250	10000 5000 S.L.	2450 2400 2400	42 42 42	RUN RUN RUN	95 86 82	315 295 280	275 255 245	2200 2200 2200	40 40 40	RUN RUN RUN	73 69 65	295 285 265	255 245 230	1900 1950 1950	37 37 37	RUN RUN RUN	57 55 52	265 255 240	230 220 210	10000 5000 S.L.	1700 1750 1750	35 35 36	RUN RUN RUN	50 48 45	240 235 225	210 205 195

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 320 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 59 GAL.) TO FLY 1500 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 75 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—One 110-gallon Tank and One 1000-pound Bomb

AAFHC-528
6-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 9600 POUNDS

EXTERNAL LOAD ITEMS
1 - 110-GALLON COMBAT TANK
AND 1 - 1000-LB. BOMB

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SEC. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																															
770		670				269	940		820				1130		980				1320		1140				269	1390		1210			
690		600				240	840		730				1010		870				1170		1020				240	1240		1080			
630		550				220	770		670				920		800				1080		930				220	1140		990			
570		500				200	700		610				840		730				980		850				200	1030		900			
510		450				180	630		550				760		660				880		760				180	930		810			
460		400				160	560		490				670		580				780		680				160	830		720			
400		350				140	490		430				590		510				690		590				140	720		630			
340		300				120	420		360				500		440				590		510				120	620		540			
290		250				100	350		300				420		360				490		420				100	520		450			
230		200				80	280		240				340		290				390		340				80	410		360			
170		150				60	210		180				250		220				290		250				60	310		270			
110		100				40	140		120				170		150				200		170				40	210		180			
MAXIMUM CONTINUOUS						PRESS ALT. FEET	(3.5 STAT. (3.0 NAUT.) MI./GAL.)						(4.2 STAT. (3.65 NAUT.) MI./GAL.)						(4.9 STAT. (4.25 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000						
						35000																			35000						
						30000																			30000						
2700	46	RUN	96	355	310	25000							2300	40	RUN	80	335	290							25000						
2700	46	RUN	119	365	315	20000	2550	F.T.	RUN	100	350	305	2350	F.T.	RUN	80	330	285	2100	F.T.	RUN	59	285	245	20000						
2700	46	RUN	115	345	300	15000	2400	42	RUN	95	330	285	2200	F.T.	RUN	74	310	270	1950	F.T.	RUN	57	275	240	15000						
2700	46	RUN	110	325	280	10000	2400	42	RUN	89	310	270	2200	40	RUN	72	295	255	1900	37	RUN	55	265	230	10000	1600	33	RUN	45	230	200
2700	46	RUN	106	310	270	5000	2400	42	RUN	86	295	255	2150	40	RUN	66	275	240	1900	37	RUN	52	250	215	5000	1600	33	RUN	43	225	195
2700	46	RUN	101	290	250	S.L.	2400	42	RUN	82	280	245	2150	40	RUN	62	260	225	1850	37	RUN	49	235	205	S.L.	1600	34	RUN	42	215	185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF A CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 90 GAL.) TO FLY 1000 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

Figure 75 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—One 110-gallon Tank and One 1000-pound Bomb

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-527
4-1-44

AIRCRAFT MODEL(S)
P-51D AND K

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODEL(S)
V-1650-7

TAKE-OFF DISTANCE FEET

GROSS WEIGHT LB.	HEAD WIND M.P.H.	HEAD WIND KTS.	HARD SURFACE RUNWAY AT SEA LEVEL GROUND RUN	HARD SURFACE RUNWAY AT SEA LEVEL TO CLEAR 50' OBJ.	HARD SURFACE RUNWAY AT 3000 FEET GROUND RUN	HARD SURFACE RUNWAY AT 3000 FEET TO CLEAR 50' OBJ.	HARD SURFACE RUNWAY AT 6000 FEET GROUND RUN	HARD SURFACE RUNWAY AT 6000 FEET TO CLEAR 50' OBJ.	SOD-TURF RUNWAY AT SEA LEVEL GROUND RUN	SOD-TURF RUNWAY AT SEA LEVEL TO CLEAR 50' OBJ.	SOD-TURF RUNWAY AT 3000 FEET GROUND RUN	SOD-TURF RUNWAY AT 3000 FEET TO CLEAR 50' OBJ.	SOD-TURF RUNWAY AT 6000 FEET GROUND RUN	SOD-TURF RUNWAY AT 6000 FEET TO CLEAR 50' OBJ.	SOFT SURFACE RUNWAY AT SEA LEVEL GROUND RUN	SOFT SURFACE RUNWAY AT SEA LEVEL TO CLEAR 50' OBJ.	SOFT SURFACE RUNWAY AT 3000 FEET GROUND RUN	SOFT SURFACE RUNWAY AT 3000 FEET TO CLEAR 50' OBJ.	SOFT SURFACE RUNWAY AT 6000 FEET GROUND RUN	SOFT SURFACE RUNWAY AT 6000 FEET TO CLEAR 50' OBJ.
11,000	0	0	1800	2700	2000	3000	2300	3300	2000	2800	2100	3100	2400	3400	2300	3200	2500	3400	2800	3900
	17	15	1400	2100	1500	2300	1800	2600	1500	2200	1600	2400	1900	2700	1700	2500	1900	2700	2200	3100
	34	30	1000	1600	1100	1800	1300	2100	1100	1700	1200	1900	1400	2100	1200	1900	1400	2100	1600	2400
	51	45	700	1200	800	1300	900	1500	700	1200	800	1400	1000	1600	800	1300	1000	1500	1200	1700
10,000	0	0	1600	2400	1800	2500	2000	2800	1700	2400	1800	2600	2100	3000	1900	2700	2100	2900	2400	3200
	17	15	1200	1800	1300	2000	1500	2300	1300	1900	1400	2100	1600	2400	1400	2100	1600	2300	1800	2500
	34	30	900	1400	1000	1500	1100	1800	900	1400	1000	1600	1200	1800	1000	1600	1200	1700	1300	2000
	51	45	600	1000	700	1100	800	1300	600	1000	700	1200	800	1300	700	1100	800	1200	900	1500
9000	0	0	1400	2000	1500	2200	1700	2500	1400	2100	1600	2300	1800	2500	1600	2300	1800	2500	2000	2800
	17	15	1000	1600	1200	1700	1300	2000	1100	1600	1200	1800	1400	2000	1200	1800	1300	1900	1500	2200
	34	30	700	1200	800	1300	1000	1500	800	1200	900	1400	1000	1500	900	1300	1000	1400	1100	1700
	51	45	500	800	600	1000	700	1100	500	900	600	1000	700	1100	600	900	700	1000	800	1200

NOTE: INCREASE CHART DISTANCES AS FOLLOWS: 75°F + 10%; 100°F + 20%; 125°F + 30%; 150°F + 40%
DATA AS OF 8-20-44 BASED ON: FLIGHT TESTS
OPTIMUM TAKE-OFF WITH 3000 RPM, 61 IN.HG. & 20 DEG.FLAP IS 80% OF CHART VALUES

CLIMB DATA

GROSS WEIGHT LB.	AT SEA LEVEL BEST I.A.S. MPH	AT SEA LEVEL BEST I.A.S. KTS	AT SEA LEVEL RATE OF CLIMB F.P.M.	AT SEA LEVEL GAL. OF FUEL USED	AT 5000 FEET BEST I.A.S. MPH	AT 5000 FEET BEST I.A.S. KTS	AT 5000 FEET RATE OF CLIMB F.P.M.	AT 5000 FEET FROM SEA LEVEL TIME MIN.	AT 5000 FEET FROM SEA LEVEL FUEL USED	AT 10,000 FEET BEST I.A.S. MPH	AT 10,000 FEET BEST I.A.S. KTS	AT 10,000 FEET RATE OF CLIMB F.P.M.	AT 10,000 FEET FROM SEA LEVEL TIME MIN.	AT 10,000 FEET FROM SEA LEVEL FUEL USED	AT 15,000 FEET BEST I.A.S. MPH	AT 15,000 FEET BEST I.A.S. KTS	AT 15,000 FEET RATE OF CLIMB F.P.M.	AT 15,000 FEET FROM SEA LEVEL TIME MIN.	AT 15,000 FEET FROM SEA LEVEL FUEL USED	AT 25,000 FEET BEST I.A.S. MPH	AT 25,000 FEET BEST I.A.S. KTS	AT 25,000 FEET RATE OF CLIMB F.P.M.	AT 25,000 FEET FROM SEA LEVEL TIME MIN.	AT 25,000 FEET FROM SEA LEVEL FUEL USED	AT 35,000 FEET BEST I.A.S. MPH	AT 35,000 FEET BEST I.A.S. KTS	AT 35,000 FEET RATE OF CLIMB F.P.M.	AT 35,000 FEET FROM SEA LEVEL TIME MIN.	AT 35,000 FEET FROM SEA LEVEL FUEL USED
11,000	175	150	1450	15	175	150	1500	3.4	20	175	150	1500	6.8	26	170	150	1450	10.5	31	165	145	1100	19	44	145	130	150	39	76
10,000	175	150	1750	15	175	150	1750	2.8	20	175	150	1800	5.6	24	170	150	1800	8.5	29	165	145	1400	15	40	145	130	850	27	58
9000	175	150	2050	15	175	150	2100	2.4	19	175	150	2150	4.8	23	170	150	2150	7.5	27	165	145	1800	13	36	145	130	750	20	48

POWER PLANT SETTINGS: (DETAILS ON FIG. 29, SECTION III): MAX. CONTINUOUS POWER
DATA AS OF 2-26-47 BASED ON:
FUEL USED (U.S.GAL.) INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

LANDING DISTANCE FEET

GROSS WEIGHT LB.	BEST IAS APPROACH POWER OFF MPH	BEST IAS APPROACH POWER OFF KTS	BEST IAS APPROACH POWER ON MPH	BEST IAS APPROACH POWER ON KTS	HARD DRY SURFACE AT SEA LEVEL GROUND ROLL	HARD DRY SURFACE AT SEA LEVEL TO CLEAR 50' OBJ.	HARD DRY SURFACE AT 3000 FEET GROUND ROLL	HARD DRY SURFACE AT 3000 FEET TO CLEAR 50' OBJ.	HARD DRY SURFACE AT 6000 FEET GROUND ROLL	HARD DRY SURFACE AT 6000 FEET TO CLEAR 50' OBJ.	FIRM DRY SOD AT SEA LEVEL GROUND ROLL	FIRM DRY SOD AT SEA LEVEL TO CLEAR 50' OBJ.	FIRM DRY SOD AT 3000 FEET GROUND ROLL	FIRM DRY SOD AT 3000 FEET TO CLEAR 50' OBJ.	FIRM DRY SOD AT 6000 FEET GROUND ROLL	FIRM DRY SOD AT 6000 FEET TO CLEAR 50' OBJ.	WET OR SLIPPERY AT SEA LEVEL GROUND ROLL	WET OR SLIPPERY AT SEA LEVEL TO CLEAR 50' OBJ.	WET OR SLIPPERY AT 3000 FEET GROUND ROLL	WET OR SLIPPERY AT 3000 FEET TO CLEAR 50' OBJ.	WET OR SLIPPERY AT 6000 FEET GROUND ROLL	WET OR SLIPPERY AT 6000 FEET TO CLEAR 50' OBJ.
10,000	130	115	130	115	1300	2500	1600	2600	1700	2800	1500	2600	1700	2800	1900	3000	3500	4800	3900	5100	4400	5500
9000	130	115	130	115	1200	2300	1400	2400	1500	2600	1400	2400	1600	2600	1700	2800	3200	4300	3500	4600	3900	5000
8000	130	115	130	115	1100	2100	1200	2200	1400	2400	1300	2200	1400	2400	1500	2600	2800	3800	3100	4100	3400	4500

DATA AS OF 8-20-44 BASED ON FLIGHT TESTS
OPTIMUM LANDING IS 80% OF CHART VALUES

REMARKS:

NOTE: TO DETERMINE FUEL CONSUMPTION IN BRITISH IMPERIAL GALLONS, MULTIPLY BY 10, THEN DIVIDE BY 12

LEGEND
I.A.S. : INDICATED AIRSPEED
M.P.H. : MILES PER HOUR
KTS. : KNOTS
F.P.M. : FEET PER MINUTE

For use with V-1650-7 engine only regardless of airplane model.

Figure 51—Take-off, Climb, and Landing Chart

AAFHC-628 6-1-44

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,200 TO 8,000 POUNDS

EXTERNAL LOAD ITEMS
WING RACKS ONLY

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	*3000	67	LOW HIGH	RUN	5 min.	135°C	210
MILITARY POWER	3000	61	LOW HIGH	RUN	15 min.	135°C	180

FOR DETAILS SEE POWER PLANT CHART (FIG. 28 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND)[1]. TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		269 (2)	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						269 (2)		
950	825	260	1065	920	1195	1040	1300	1130	260	1440	1250
880	765	240	985	855	1105	960	1200	1040	240	1330	1155
805	700	220	900	780	1010	875	1100	955	220	1220	1060
730	635	200	820	710	920	800	1000	870	200	1110	965
640	555	180	740	645	830	720	900	780	180	1000	870
585	510	160	655	570	735	640	800	695	160	890	775
515	445	140	575	500	645	560	700	610	140	775	675
440	380	120	490	425	550	475	600	520	120	665	580
365	315	100	410	355	460	400	500	435	100	555	480
295	255	80	330	285	370	320	400	350	80	445	385
220	190	60	245	210	275	240	300	260	60	335	290
145	125	40	165	145	185	160	200	175	40	220	190
75	65	20	80	70	90	78	100	87	20	110	95

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(4.10 STAT. (3.56 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.60 STAT. (4.00 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.00 STAT. (4.34 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
	SEE COLUMN II					40000 35000 30000	2700	F.T.	RUN	97	424	368	2650	F.T.	RUN	90	417	362	2700 2450	F.T. F.T.	RUN RUN	80 77	408 391	354 340	40000 35000 30000	2500 2250	F.T. F.T.	RUN RUN	66 62	367 348	319 302
	SEE COLUMN II SEE COLUMN II					25000 20000	2700 2700	46 46	RUN RUN	98 93	413 389	358 338	2400 2400	42 42.5	RUN RUN	86 80	397 371	345 322	2250 2100	F.T. 36.5	RUN RUN	73 67	370 346	321 300	25000 20000	1850 2100	F.T. F.T.	RUN RUN	59 57	335 316	291 274
2700	46	RUN	103	384	334	15000	2500	F.T.	RUN	90	373	324	2300	F.T.	RUN	76	351	305	2100	F.T.	RUN	65	326	283	15000	1800	F.T.	RUN	52	290	252
2700 2700 2700	46 46 46	RUN RUN RUN	98 91 86	361 339 315	314 286 274	10000 5000 S.L.	2500 2500 2500	42.5 43 43	RUN RUN RUN	83 79 74	346 323 300	300 280 261	2200 2200 2150	40 40 39.5	RUN RUN RUN	71 66 61	325 303 279	282 263 242	1900 1850 1800	37 36.5 36	RUN RUN RUN	60 55 50	300 278 255	261 242 222	10000 5000 S.L.	1600 1600	31 28.5 SEE COLUMN IV	RUN RUN	47 42	261 232	227 202

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAX. FUEL CAPACITY WITH FULL WING & FUSELAGE TANKS.

HIGH BLOWER ABOVE HEAVY LINE.

EXAMPLE

AT 9,500 LB. GROSS WEIGHT WITH 80 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 330 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2500 RPM AND 43 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-22-47
DATA AS OF 5-20-44 BASED ON: FLIGHT TESTS

For use with V-1650-7 engine only regardless of airplane model.

Figure 52—Flight Operation Instruction Chart—Wing Racks

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-520 8-1-44

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,200 TO 9,800 POUNDS

EXTERNAL LOAD ITEMS
TWO 500 LB. BOMBS
OR TWO 75 GAL. WING TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		419[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						419[2]		
1390	1205	410	1485	1290	1685	1465	1855	1610	410	1995	1735
1320	1145	390	1430	1240	1600	1390	1765	1535	390	1895	1650
1250	1085	370	1350	1175	1515	1315	1670	1450	370	1795	1560
1185	1030	350	1280	1110	1435	1250	1580	1370	350	1700	1480
1120	975	330	1200	1040	1350	1170	1490	1295	330	1600	1390
1050	910	310	1130	980	1265	1100	1400	1220	310	1500	1305
985	855	290	1050	915	1180	1050	1305	1135	290	1400	1220
915	795	270	980	850	1100	955	1215	1055	270	1300	1130
845	735	250	900	785	1015	885	1115	970	250	1200	1045
780	675	230	830	720	930	810	1030	895	230	1110	965
710	615	210	755	655	850	740	945	820	210	1010	880
645	560	190	685	595	770	670	855	745	190	915	795
575	500	170	610	530	690	600	765	665	170	820	715
510	445	150	540	470	605	525	675	585	150	720	625

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.60 STAT. (3.13 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.05 STAT. (3.52 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.49 STAT. (3.90 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000						
						35000																			35000						
	SEE COLUMN III					30000							2700	F.T.	RUN	94	383	333	2500	F.T.	RUN	79	356	310	30000	2300	F.T.	RUN	63	315	274
	SEE COLUMN II					25000	2700	46	RUN	98	377	328	2550	44	RUN	90	367	319	2300	F.T.	RUN	76	341	297	25000	2100	F.T.	RUN	60	305	265
	SEE COLUMN II					20000	2700	46	RUN	93	355	309	2500	44	RUN	85	344	299	2150	38	RUN	70	319	277	20000	2200	F.T.	RUN	61	294	256
2700	46	RUN	103	356	310	15000	2600	44.5	RUN	97	349	303	2400	F.T.	RUN	80	327	284	2200	F.T.	RUN	68	303	263	15000	1950	F.T.	RUN	57	277	241
2700	46	RUN	98	334	290	10000	2600	44.5	RUN	91	326	284	2300	41	RUN	75	304	264	2000	38	RUN	63	281	244	10000	1650	34.5	RUN	52	252	219
2700	46	RUN	91	312	271	5000	2600	44	RUN	84	304	264	2300	41	RUN	70	283	246	1950	37.5	RUN	58	260	226	5000	1600	34	RUN	48	230	200
2700	46	RUN	86	292	254	S.L.	2550	44	RUN	78	282	245	2250	40.5	RUN	65	262	228	1900	37	RUN	53	239	208	S.L.	1600	31	RUN	42	202	176

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAX. FUEL CAPACITY WITH 2-75 GAL. WING, ST'D. WING TANKS & FUSELAGE TANKS,
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10000 LB. GROSS WEIGHT WITH 210 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 850 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2300 RPM AND 41 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN. WHEN WEIGHT REACHES 9,800 LBS. USE POWER SETTINGS SHEET 2, COLUMN III.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 53 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart

AAFMC-528 4-1-46

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 9,800 TO 8,100 POUNDS

EXTERNAL LOAD ITEMS
TWO 500 LB. BOMBS
OR TWO 75 GAL. WING TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[2] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S.GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I			FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V		
RANGE IN AIRMILES			U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES		
STATUTE		NAUTICAL	GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																									
950		825	280	1050		915				1170		1020				1275		1110				280	1380		1200
880		765	260	975		845				1090		945				1185		1030				260	1280		1110
815		710	240	900		785				1005		875				1090		945				240	1185		1030
745		645	220	825		715				920		800				1000		870				220	1085		940
680		590	200	750		650				835		725				910		790				200	990		860
610		530	180	675		585				755		655				820		715				180	890		775
545		475	160	600		520				670		580				730		635				160	790		685
475		415	140	525		455				585		510				635		550				140	690		600
405		350	120	450		390				500		435				545		475				120	590		515
340		295	100	375		325				420		365				455		395				100	495		430
270		235	80	300		260				335		290				365		315				80	395		345
205		180	60	225		195				250		220				275		240				60	295		255
135		115	40	150		130				165		145				180		155				40	195		170
MAXIMUM CONTINUOUS				(3.75 STAT. (3.25 NAUT.) MI./GAL.)						(4.18 STAT. (3.64 NAUT.) MI./GAL.)						(4.55 STAT. (3.96 NAUT.) MI./GAL.)							MAXIMUM AIR RANGE		
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
	SEE COLUMN IV																	2700	F.T.	RUN	80	370	322	2450	F.T.	RUN	65	327	284
	SEE COLUMN III											2650	F.T.	RUN	90	381	331	2500	F.T.	RUN	78	360	313	2300	F.T.	RUN	55	326	283
	SEE COLUMN II																												
	SEE COLUMN I																												
2700	46	RUN	103	356	309	2550	43	RUN	91	341	296	2350	F.T.	RUN	79	322	280	2150	F.T.	RUN	66	300	261	1900	F.T.	RUN	55	272	236
2700	46	RUN	98	333	289	2500	43	RUN	83	316	275	2200	40	RUN	71	298	259	1950	37	RUN	61	278	242	1600	34	RUN	50	251	218
2700	46	RUN	91	311	270	2450	42.5	RUN	77	293	255	2200	40	RUN	66	276	240	1900	37	RUN	55	256	222	1600	32.5	RUN	46	229	199
2700	46	RUN	86	291	253	2450	42.5	RUN	72	273	237	2150	39.5	RUN	61	256	222	1850	37	36.5	51	236	205	1600	29.5	RUN	41	200	174

PRESS ALT. FEET
40000
35000
30000
25000
20000
15000
10000
5000
S.L.

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 9,400 LB. GROSS WEIGHT WITH 100 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 420 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2200 RPM AND 40 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S.GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 53 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-528 4-1-46

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 9,800 TO 8,100 POUNDS

EXTERNAL LOAD ITEMS
TWO 500 LB. BOMBS
OR TWO 75 GAL. WING TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[2] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S.GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I			FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V		
RANGE IN AIRMILES			U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES		
STATUTE		NAUTICAL	GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																									
950		825	280	1050		915				1170		1020				1275		1110				280	1380		1200
880		765	260	975		845				1090		945				1185		1030				260	1280		1110
815		710	240	900		785				1005		875				1090		945				240	1185		1030
745		645	220	825		715				920		800				1000		870				220	1085		940
680		590	200	750		650				835		725				910		790				200	990		860
610		530	180	675		585				755		655				820		715				180	890		775
545		475	160	600		520				670		580				730		635				160	790		685
475		415	140	525		455				585		510				635		550				140	690		600
405		350	120	450		390				500		435				545		475				120	590		515
340		295	100	375		325				420		365				455		395				100	495		430
270		235	80	300		260				335		290				365		315				80	395		345
205		180	60	225		195				250		220				275		240				60	295		255
135		115	40	150		130				165		145				180		155				40	195		170
MAXIMUM CONTINUOUS				(3.75 STAT. (3.25 NAUT.) MI./GAL.)						(4.18 STAT. (3.64 NAUT.) MI./GAL.)						(4.55 STAT. (3.96 NAUT.) MI./GAL.)							MAXIMUM AIR RANGE		
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
	SEE COLUMN IV																	2700	F.T.	RUN	80	370	322	2450	F.T.	RUN	65	327	284
	SEE COLUMN III											2650	F.T.	RUN	90	381	331	2500	F.T.	RUN	78	360	313	2300	F.T.	RUN	55	326	283
	SEE COLUMN II																												
	SEE COLUMN I																												
2700	46	RUN	103	356	309	2550	43	RUN	91	341	296	2350	F.T.	RUN	79	322	280	2150	F.T.	RUN	66	300	261	1900	F.T.	RUN	55	272	236
2700	46	RUN	98	333	289	2500	43	RUN	83	316	275	2200	40	RUN	71	298	259	1950	37	RUN	61	278	242	1600	34	RUN	50	251	218
2700	46	RUN	91	311	270	2450	42.5	RUN	77	293	255	2200	40	RUN	66	276	240	1900	37	RUN	55	256	222	1600	32.5	RUN	46	229	199
2700	46	RUN	86	291	253	2450	42.5	RUN	72	273	237	2150	39.5	RUN	61	256	222	1850	37	36.5	51	236	205	1600	29.5	RUN	41	200	174

PRESS ALT. FEET
40000
35000
30000
25000
20000
15000
10000
5000
S.L.

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 9,400 LB. GROSS WEIGHT WITH 100 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 420 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 2200 RPM AND 40 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S.GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 53 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 13,000 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS + 2-75 GAL. WING TANKS
OR 6 ROCKETS + 2-110 GAL. WING TANKS
OR 6 ROCKETS + 1-110 GAL. W. TANK + 1-1000# BOMB
OR 6 ROCKETS + 2-1000# BOMBS

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. 29SECT.III)
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "	
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		489[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						489[2]		
1490	1295	480	1590	1380	1740	1510	1860	1620	480	1940	1685
1395	1210	450	1485	1290	1625	1410	1730	1505	450	1810	1570
1300	1130	420	1380	1200	1510	1310	1600	1390	420	1680	1460
1205	1045	390	1280	1110	1390	1210	1475	1280	390	1550	1350
1110	965	360	1175	1020	1275	1110	1345	1170	360	1415	1230
1015	880	330	1070	930	1160	1010	1220	1060	330	1290	1120
925	805	300	970	845	1055	915	1110	965	300	1170	1015
830	720	270	875	760	950	825	1000	870	270	1055	915
740	645	240	780	680	840	730	890	775	240	935	810
645	560	210	680	590	740	645	775	675	210	820	715
555	480	180	585	510	630	550	665	580	180	700	610
460	400	150	485	420	525	455	555	480	150	585	510
370	320	120	390	340	420	365	445	385	120	470	410

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.24 STAT. (2.82 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.51 STAT. (3.05 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.70 STAT. (3.22 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000							
						35000																			35000							
						30000																			30000							
	SEE COLUMN I					25000	2700	46	RUN	98	332	288	2550	44	RUN	92	323	281	2350	F.T.	RUN	80	295	256	25000							
	SEE COLUMN I					20000	2700	46	RUN	93	314	273	2550	44.5	RUN	86	304	264	2350	41	RUN	77	285	248	20000							
2700	46	RUN	103	322	280	15000	2600	44.5	RUN	97	314	273	2450	F.T.	RUN	85	299	260	2350	F.T.	RUN	77	284	247	15000	2100	F.T.	RUN	63	245	213
2700	46	RUN	98	302	262	10000	2600	44.5	RUN	91	295	256	2400	42	RUN	80	281	244	2250	40	RUN	72	267	232	10000	1950	37.5	RUN	61	240	209
2700	46	RUN	91	283	246	5000	2600	44.5	RUN	85	275	239	2400	42	RUN	74	261	227	2200	40	RUN	66	247	215	5000	1950	36	RUN	57	223	194
2700	46	RUN	86	265	230	S.L.	2600	44	RUN	78	256	222	2350	41.5	RUN	69	243	211	2200	40	RUN	62	231	201	S.L.	1900	37	RUN	53	205	178

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
(2) MAX. FUEL CAPACITY WITH 2-110 GAL. WING TANKS, ST'D. WING TANKS & FUSELAGE TANKS.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,800 LB. GROSS WEIGHT WITH 330 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 26 GAL.) TO FLY 1220 STAT. AIRMILES AT 10,000 FT. ALTITUDE MAINTAIN 2250 RPM AND 40 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN. WHEN WEIGHT REACHES 11,000 LBS. USE POWER SETTINGS SHEET 2, COLUMN IV.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-23-47
DATA AS OF 12-1-44 BASED ON: FLIGHT TESTS

For use with V-1650-7 engine only regardless of airplane model.

Figure 54 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

AFPMC-528
4-1-45

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 8,900 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS + 2-75 GAL. WING TANKS
OR 6 ROCKETS + 2-110 GAL. WING TANKS
OR 6 ROCKETS + 1-110 GAL. N. TANK + 1-1000# BOMB
OR 6 ROCKETS + 2-1000# BOMBS

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN[1] EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM. MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[2] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[3]								
1040 950	905 825	330 300	1170 1065	1015 925	1285 1170	1115 1020	1400 1275	1220 1110	330 300	1440 1310	1250 1140
855 760 665	745 660 580	270 240 210	960 850 745	835 740 645	1050 935 820	910 815 715	1150 1020 895	1000 885 775	270 240 210	1180 1050 915	1025 915 795
520 475 380	450 415 330	180 150 120	640 530 425	555 460 370	700 585 470	610 510 410	765 635 510	665 550 445	180 150 120	785 655 525	680 570 455
285 190 95	250 165 83	90 60 30	320 215 105	280 185 91	350 235 115	305 205 100	380 255 125	330 220 110	90 60 30	390 260 130	425 226 115

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.56 STAT. (3.08 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.90 STAT. (3.39 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.25 STAT. (3.70 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
	SEE COLUMN II SEE COLUMN II					25000 20000	2700 2650	46 45.5	RUN RUN	98 91	350 327	304 284	2350 2300	F.T. 41	RUN RUN	81 77	322 303	280 263	2150 2000	F.T. 34.5	RUN RUN	64 63	276 273	240 237	25000 20000	2150 1950	F.T. F.T.	RUN RUN	60 57	261 253	227 220
2700	46	RUN	103	332	288	15000	2500	F.T.	RUN	89	316	275	2300	F.T.	RUN	74	292	254	2100	F.T.	RUN	63	269	234	15000						
2700 2700 2700	46 46 46	RUN RUN RUN	98 91 86	311 250 272	270 252 236	10000 5000 S.L.	2500 2450 2400	43 42.5 42	RUN RUN RUN	83 77 71	295 273 254	256 237 221	2150 2100 2050	39.5 39 38.5	RUN RUN RUN	69 65 57	273 252 233	237 219 202	1900 1850 1800	37 36.5 36	RUN RUN RUN	60 55 50	253 233 212	220 202 184	10000 5000 S.L.	1650 1600	34.5 34 (SEE COLUMN IV)	RUN RUN	52 48	225 210	196 183

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,600 LB. GROSS WEIGHT WITH 270 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 26 GAL.) TO FLY 1150 STAT. AIRMILES AT 10000 FT. ALTITUDE MAINTAIN 1900 RPM AND 37 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-23-47
DATA AS OF 12-1-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 54 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-828 4-1-45

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,200 TO 10,300 POUNDS

EXTERNAL LOAD ITEMS
TWO 1000# BOMBS
OR ONE 1000# BOMBS + ONE 110 GAL. W. TANK
OR TWO 110 GAL. WING TANKS
(OR TEN 5" ROCKETS)

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 min.	135°C	210
MILITARY POWER	3000	61	LOW HIGH	RUN	15 min.	135°C	180

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		489[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						489[2]		
1590	1380	480	1745	1515	1955	1700	2145	1865	480	2250	1955
1455 1325 1190	1265 1150 1035	440 400 360	1595 1445 1295	1385 1255 1125	1785 1615 1445	1550 1405 1255	1960 1770 1580	1700 1540 1370	440 400 360	2055 1855 1660	1780 1610 1440
1060 925 795	920 805 690	320 280 240	1145 1000 855	995 870 745	1275 1115 955	1110 970 830	1390 1220 1045	1210 1060 910	320 280 240	1460 1280 1095	1270 1110 950
660 530	575 460	200 160	715 570	620 495	795 635	690 550	870 695	755 605	200 160	915 730	795 635

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.57 STAT. (3.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.98 STAT. (3.46 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.35 STAT. (3.78 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
	SEE COLUMN I SEE COLUMN I					25000 20000	2700 2700	46 46	RUN RUN	98 93	370 349	322 303	2500 2500	43.5 43.5	RUN RUN	89 84	356 335	309 291	2250 2150	F.T. 37.5	RUN RUN	72 70	313 304	272 264	25000 20000	2200	F.T.	RUN	81	280	243
2700	46	RUN	103	352	306	15000	2600	44	RUN	95	343	298	2400	F.T.	RUN	81	322	280	2150	F.T.	RUN	66	291	253	15000	2000	F.T.	RUN	59	271	236
2700 2700 2700	46 46 46	RUN RUN RUN	96 91 86	327 308 288	284 268 250	10000 5000 S.L.	2550 2550 2550	44 44 44	RUN RUN RUN	89 82 78	317 298 278	276 259 242	2250 2250 2250	40.5 40.5 40.5	RUN RUN RUN	74 69 65	297 278 260	258 242 226	1950 1950 1950	37.5 37.5 37.5	RUN RUN RUN	62 58 54	272 254 235	236 221 204	10000 5000 S.L.	1800 1650 1600	36 34.5 34	RUN RUN RUN	56 49 46	253 225 210	220 195 182

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

(2) MAX. FUEL CAPACITY WITH 2-110 GAL. WING TANKS, ST'D. WING TANKS & FUSELAGE TANKS.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 280 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 1270 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 1950 RPM AND 37.5 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN- WHEN WEIGHT REACHES 10,300 LBS. USE POWER SETTING SHEET 2, COLUMN IV.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-24-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

Figure 55 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

AAFMC-828 4-1-45

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,200 TO 10,300 POUNDS

EXTERNAL LOAD ITEMS
TWO 1000# BOMBS
OR ONE 1000# BOMBS + ONE 110 GAL. W. TANK
OR TWO 110 GAL. WING TANKS
(OR TEN 5" ROCKETS)

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 min.	135°C	210
MILITARY POWER	3000	61	LOW HIGH	RUN	15 min.	135°C	180

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
		489[2]	SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						489[2]		
1590	1380	480	1745	1515	1955	1700	2145	1865	480	2250	1955
1455 1325 1190	1265 1150 1035	440 400 360	1595 1445 1295	1385 1255 1125	1785 1615 1445	1550 1405 1255	1960 1770 1580	1700 1540 1370	440 400 360	2055 1855 1660	1780 1610 1440
1060 925 795	920 805 690	320 280 240	1145 1000 855	995 870 745	1275 1115 955	1110 970 830	1390 1220 1045	1210 1060 910	320 280 240	1460 1280 1095	1270 1110 950
660 530	575 460	200 160	715 570	620 495	795 635	690 550	870 695	755 605	200 160	915 730	795 635

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.57 STAT. (3.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.98 STAT. (3.46 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.35 STAT. (3.78 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
	SEE COLUMN I SEE COLUMN I					25000 20000	2700 2700	46 46	RUN RUN	98 93	370 349	322 303	2500 2500	43.5 43.5	RUN RUN	89 84	356 335	309 291	2250 2150	F.T. 37.5	RUN RUN	72 70	313 304	272 264	25000 20000	2200	F.T.	RUN	81	280	243
2700	46	RUN	103	352	306	15000	2600	44	RUN	95	343	298	2400	F.T.	RUN	81	322	280	2150	F.T.	RUN	66	291	253	15000	2000	F.T.	RUN	59	271	236
2700 2700 2700	46 46 46	RUN RUN RUN	96 91 86	327 308 288	284 268 250	10000 5000 S.L.	2550 2550 2550	44 44 44	RUN RUN RUN	89 82 78	317 298 278	276 259 242	2250 2250 2250	40.5 40.5 40.5	RUN RUN RUN	74 69 65	297 278 260	258 242 226	1950 1950 1950	37.5 37.5 37.5	RUN RUN RUN	62 58 54	272 254 235	236 221 204	10000 5000 S.L.	1800 1650 1600	36 34.5 34	RUN RUN RUN	56 49 46	253 225 210	220 195 182

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

(2) MAX. FUEL CAPACITY WITH 2-110 GAL. WING TANKS, ST'D. WING TANKS & FUSELAGE TANKS.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 280 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 1270 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 1950 RPM AND 37.5 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN- WHEN WEIGHT REACHES 10,300 LBS. USE POWER SETTING SHEET 2, COLUMN IV.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-24-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-7 engine only regardless of airplane model.

Figure 55 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart

AAFHC-528
6-1-46

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,300 TO 8,100 POUNDS

EXTERNAL LOAD ITEMS
TWO 1000# BOMBS
OR ONE 1000# BOMBS + ONE 110 GAL. M. TANK
OR TWO 110 GAL. WING TANKS
(OR TEN 5" ROCKETS)

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I			FUEL	COLUMN II			COLUMN III			COLUMN IV			FUEL	COLUMN V		
RANGE IN AIRMILES			U.S.	RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES			U.S.	RANGE IN AIRMILES		
STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL	
				SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]												
1330	1155		400	1505	1310		1700	1480		1895	1650		400	1980	1720	
1195 1060 930	1040 920 810		360 320 280	1355 1205 1050	1180 1045 910		1530 1360 1190	1330 1180 1035		1705 1515 1325	1480 1315 1150		360 320 280	1780 1585 1385	1545 1380 1205	
795 665 530	690 580 460		240 200 160	900 750 600	780 650 520		1020 850 680	885 740 590		1135 945 755	985 820 655		240 200 160	1190 990 790	1035 860 685	
400 265 135	350 230 115		120 80 40	450 300 150	390 260 130		510 340 170	445 295 150		565 380 190	490 330 165		120 80 40	595 395 200	515 345 175	
MAXIMUM CONTINUOUS			PRESS ALT. FEET	(3.76 STAT. (3.27 NAUT.) MI./GAL.)			(4.25 STAT. (3.69 NAUT.) MI./GAL.)			(4.73 STAT. (4.11 NAUT.) MI./GAL.)			PRESS ALT. FEET	MAXIMUM AIR RANGE		
R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
	SEE COLUMN IV												40000 35000 30000										
	SEE COLUMN III SEE COLUMN II					2700	F.T.	RUN	96	383	333	2600	F.T.	RUN	87	368	320	2350	F.T.	RUN	69	330	287	25000 20000	2050 2100	F.T. F.T.	RUN RUN	58 57	290 283	252 246
2700	46	RUN	103	351	305	2700 2650 2500	46 46.5 F.T.	RUN RUN RUN	98 91 89	372 347 335	323 302 291	2400 2300 2300	F.T. 40.5 F.T.	RUN RUN RUN	82 77 73	340 325 311	303 282 270	2200 2000 2000	F.T. 33.5 F.T.	RUN RUN RUN	67 61 59	318 296 279	276 257 242	15000	1850	F.T.	RUN	53	261	227
2700 2700 2700	46 46 46	RUN RUN RUN	96 91 86	330 308 289	287 268 251	2400 2400 2400	42 42 42	RUN RUN RUN	81 75 71	310 288 268	269 250 233	2150 2100 2050	39 39 38.5	RUN RUN RUN	68 65 57	288 267 246	250 232 214	1750 1700 1600	35.5 35 33.5	RUN RUN RUN	54 50 45	259 239 214	234 208 186	10000 5000 S.L.	1600 1600	32.5 30.5	RUN RUN	48 44	239 215	208 187
																										(SEE COLUMN IV)						

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 120 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 565 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 1700 RPM AND 35 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 55 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

AAFHC-528
6-1-46

AIRCRAFT MODEL(S)
P-51D & K

ENGINE(S): V-1650-7

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,300 TO 8,100 POUNDS

EXTERNAL LOAD ITEMS
TWO 1000# BOMBS
OR ONE 1000# BOMBS + ONE 110 GAL. M. TANK
OR TWO 110 GAL. WING TANKS
(OR TEN 5" ROCKETS)

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	COOL'T TEMP.	TOTAL G.P.H.
WAR EMERG.	3000 "	67 "	LOW HIGH	RUN "	5 min.	135°C "	210 "
MILITARY POWER	3000 "	61 "	LOW HIGH	RUN "	15 min.	135°C "	180 "

FOR DETAILS SEE POWER PLANT CHART (FIG. 29 SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I			FUEL	COLUMN II			COLUMN III			COLUMN IV			FUEL	COLUMN V		
RANGE IN AIRMILES			U.S.	RANGE IN AIRMILES			RANGE IN AIRMILES			RANGE IN AIRMILES			U.S.	RANGE IN AIRMILES		
STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL		STATUTE	NAUTICAL		STATUTE	NAUTICAL		GAL.	STATUTE	NAUTICAL	
				SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]												
1330	1155		400	1505	1310		1700	1480		1895	1650		400	1980	1720	
1195 1060 930	1040 920 810		360 320 280	1355 1205 1050	1180 1045 910		1530 1360 1190	1330 1180 1035		1705 1515 1325	1480 1315 1150		360 320 280	1780 1585 1385	1545 1380 1205	
795 665 530	690 580 460		240 200 160	900 750 600	780 650 520		1020 850 680	885 740 590		1135 945 755	985 820 655		240 200 160	1190 990 790	1035 860 685	
400 265 135	350 230 115		120 80 40	450 300 150	390 260 130		510 340 170	445 295 150		565 380 190	490 330 165		120 80 40	595 395 200	515 345 175	
MAXIMUM CONTINUOUS			PRESS ALT. FEET	(3.76 STAT. (3.27 NAUT.) MI./GAL.)			(4.25 STAT. (3.69 NAUT.) MI./GAL.)			(4.73 STAT. (4.11 NAUT.) MI./GAL.)			PRESS ALT. FEET	MAXIMUM AIR RANGE		
R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
	SEE COLUMN IV												40000 35000 30000										
	SEE COLUMN III SEE COLUMN II					2700	F.T.	RUN	96	383	333	2600	F.T.	RUN	87	368	320	2350	F.T.	RUN	69	330	287	25000 20000	2050 2100	F.T. F.T.	RUN RUN	58 57	290 283	252 246
2700	46	RUN	103	351	305	2700 2650 2500	46 46.5 F.T.	RUN RUN RUN	98 91 89	372 347 335	323 302 291	2400 2300 2300	F.T. 40.5 F.T.	RUN RUN RUN	82 77 73	340 325 311	303 282 270	2200 2000 2000	F.T. 33.5 F.T.	RUN RUN RUN	67 61 59	318 296 279	276 257 242	15000	1850	F.T.	RUN	53	261	227
2700 2700 2700	46 46 46	RUN RUN RUN	96 91 86	330 308 289	287 268 251	2400 2400 2400	42 42 42	RUN RUN RUN	81 75 71	310 288 268	269 250 233	2150 2100 2050	39 39 38.5	RUN RUN RUN	68 65 57	288 267 246	250 232 214	1750 1700 1600	35.5 35 33.5	RUN RUN RUN	54 50 45	259 239 214	234 208 186	10000 5000 S.L.	1600 1600	32.5 30.5	RUN RUN	48 44	239 215	208 187
																										(SEE COLUMN IV)						

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG. 51) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.
HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 120 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 20 GAL.) TO FLY 565 STAT. AIRMILES AT 5000 FT. ALTITUDE MAINTAIN 1700 RPM AND 35 IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN.

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

REVISED 1-21-47
DATA AS OF 9-10-44 BASED ON: FLIGHT TEST

For use with V-1650-7 engine only regardless of airplane model.

Figure 55 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-527
6-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

TAKE-OFF, CLIMB & LANDING CHART

ENGINE MODEL(S)
V-1650-3

TAKE-OFF DISTANCE FEET

GROSS WEIGHT LB.	HEAD WIND		HARD SURFACE RUNWAY						SOD-TURF RUNWAY						SOFT SURFACE RUNWAY					
			AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET	
	M.P.H.	KTS.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.
9000	0	0	1350	2000	1500	2200	1700	2450	1450	2100	1600	2250	1800	2500	1600	2250	1750	2450	2000	2750
	17	15	1000	1550	1150	1700	1300	1950	1050	1600	1200	1800	1350	2000	1200	1750	1350	1900	1500	2200
	34	30	750	1150	800	1300	950	1500	750	1200	850	1350	1000	1550	850	1200	950	1400	1100	1650
	51	45	500	850	550	950	650	1100	500	850	600	1000	700	1150	550	900	600	1050	750	1200
11,000	0	0	1850	2700	2000	2950	2250	3300	1950	2800	2100	3050	2400	3400	2250	3150	2400	3400	2800	3800
	17	15	1350	2150	1500	2300	1750	2650	1450	2200	1600	2400	1850	2700	1700	2450	1900	2700	2150	3100
	34	30	950	1600	1100	1750	1300	2050	1050	1650	1200	1850	1400	2100	1200	1850	1400	2050	1600	2300
	51	45	650	1150	750	1250	900	1500	700	1200	800	1350	950	1550	800	1250	950	1500	1150	1750
13,000	0	0	2300	3600	2500	3800	2800	4300	2450	3700	2650	3950	3000	4550	2900	4300	3200	4800	3600	5300
	17	15	1700	2800	1900	3050	2200	3400	1850	2900	2050	3200	2350	3600	2200	3300	2400	3700	2800	4200
	34	30	1200	2050	1400	2300	1650	2700	1350	2150	1500	2400	1750	2850	1600	2450	1800	2850	2100	3200
	51	45	850	1550	1000	1750	1200	2100	900	1600	1050	1800	1300	2250	1100	1700	1300	2100	1550	2700

NOTE: INCREASE CHART DISTANCES AS FOLLOWS: 75°F + 10%; 100°F + 20%; 125°F + 30%; 150°F + 40%

OPTIMUM TAKE-OFF WITH 3000 RPM, 61 IN.HG. & 20 DEG. FLAP IS 80% OF CHART VALUES

DATA AS OF 5-8-45 BASED ON: FLIGHT TESTS

CLIMB DATA

GROSS WEIGHT LB.	AT SEA LEVEL				AT 5000 FEET					AT 10,000 FEET					AT 15,000 FEET					AT 20,000 FEET					AT 25,000 FEET				
	BEST I.A.S.		RATE OF CLIMB F.P.M.	GAL. OF FUEL USED	BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL		BEST I.A.S.		RATE OF CLIMB F.P.M.	FROM SEA LEVEL	
	MPH	KTS			MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED	MPH	KTS		TIME MIN.	FUEL USED
9000	170	145	2200	15	170	145	2200	2.5	19	170	145	2250	5.0	23	170	145	2250	7.5	27	165	145	1900	10.0	31	160	140	1650	13.0	35
11,000	170	145	1500	15	170	145	1500	3.5	20	170	145	1500	7.0	26	170	145	1500	10.5	32	165	145	1150	14.0	39	160	140	900	19.0	47
13,000	175	150	1000	15	175	150	950	5.5	23	175	150	900	11.0	32	175	150	850	17.0	42	170	145	550	23.0	55	165	145	300	37.0	75

POWER PLANT SETTINGS: (DETAILS ON FIG. SECTION III):

FUEL USED (U.S.GAL.) INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

DATA AS OF 5-8-45 BASED ON: FLIGHT TESTS

LANDING DISTANCE FEET

GROSS WEIGHT LB.	BEST IAS APPROACH				HARD DRY SURFACE						FIRM DRY SOD						WET OR SLIPPERY					
	POWER OFF		POWER ON		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET		AT SEA LEVEL		AT 3000 FEET		AT 6000 FEET	
	MPH	KTS	MPH	KTS	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.	GROUND ROLL	TO CLEAR 50' OBJ.
9000	130	115	130	115	1200	2300	1400	2400	1500	2600	1400	2400	1600	2600	1700	2800	3200	4300	3500	4600	3900	5000
8000	130	115	130	115	1100	2100	1200	2200	1400	2400	1300	2200	1400	2400	1500	2600	2900	3800	3100	4100	3400	4500

DATA AS OF 5-8-45 BASED ON: FLIGHT TESTS

OPTIMUM LANDING IS 80% OF CHART VALUES

REMARKS:

NOTE: TO DETERMINE FUEL CONSUMPTION IN BRITISH IMPERIAL GALLONS, MULTIPLY BY 10, THEN DIVIDE BY 12

MIXTURE: USE "RUN" OR "AUTO RICH - AUTO LEAN"

LEGEND

I.A.S. : INDICATED AIRSPEED
M.P.H. : MILES PER HOUR
KTS. : KNOTS
F.P.M. : FEET PER MINUTE

Figure 64—Take-off, Climb and Landing Chart

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,000 TO 8500 POUNDS

EXTERNAL LOAD ITEMS
WING RACKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
860	750	269	1130	980	1340	1170	1550	1340	269	1620	1410
770	670	240	1010	870	1200	1040	1380	1200	240	1450	1260
700	610	220	920	800	1100	950	1260	1100	220	1330	1150
640	560	200	840	730	1000	870	1150	1000	200	1210	1050
580	500	180	760	660	900	780	1030	900	180	1090	940
510	440	160	670	580	800	690	920	800	160	970	840
450	390	140	590	510	700	610	800	700	140	850	730
380	330	120	500	440	600	520	690	600	120	730	630
320	280	100	420	360	500	430	570	500	100	600	520
260	220	80	340	290	400	350	460	400	80	480	420
190	170	60	250	220	300	260	340	300	60	360	310
130	110	40	170	150	200	170	230	200	40	240	210

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(4.2 STAT. (3.65 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.0 STAT. (4.35 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.75 STAT. (5.0 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
2700	F.T.	RUN	90	420	365	40000																			40000						
2700	46	RUN	100	425	370	35000							2600	F.T.	RUN	80	405	350							35000						
						30000							2350	F.T.	RUN	79	395	345							30000						
2700	46	RUN	96	395	345	25000	2600	45	RUN	83	395	345	2200	39	RUN	75	370	320	2000	37	RUN	56	320	280	25000						
2700	46	RUN	119	405	350	20000	2450	F.T.	RUN	90	380	330	2300	F.T.	RUN	72	355	310	2050	F.T.	RUN	55	315	275	20000	1900	F.T.	RUN	48	280	245
2700	46	RUN	115	380	330	15000	2300	41	RUN	86	360	310	2100	F.T.	RUN	68	335	290	1900	F.T.	RUN	53	300	260	15000	1700	F.T.	RUN	45	270	235
2700	46	RUN	110	360	310	10000	2300	41	RUN	80	335	290	2050	39	RUN	63	315	275	1750	35	RUN	50	285	245	10000	1600	31	RUN	44	260	225
2700	46	RUN	106	340	295	5000	2300	41	RUN	75	315	275	2050	39	RUN	59	295	255	1700	35	RUN	47	265	220	5000	1600	31	RUN	41	245	215
2700	46	RUN	101	320	280	S.L.	2300	41	RUN	73	300	260	2050	39	RUN	57	280	245	1700	35	RUN	44	250	215	S.L.	1600	31	RUN	38	220	200

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL
(AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.)
TO FLY 1200 STAT. AIRMILES AT 25,000 FT. ALTITUDE
MAINTAIN 2000 RPM AND 32 IN. MANIFOLD PRESSURE
WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 65—Flight Operation Instruction Chart—No External Load

AAFMC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 10,000 POUNDS

EXTERNAL LOAD ITEMS
2 - 500-POUND WING BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
790	680	269	1000	870	1200	1040	1380	1190	269	1440	1250
700	610	240	900	780	1070	930	1230	1060	240	1290	1120
640 590	560 510	220 200	830 750	720 650	980 900	850 770	1130 1020	980 890	220 200	1190 1080	1020 930
530 470	460 410	180 160	680 610	590 530	810 720	700 620	920 820	800 710	180 160	980 870	840 750

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.6 STAT. (3.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(4.4 STAT. (3.80 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(5.1 STAT. (4.45 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	360	310	25000							2200	39	RUN	76	325	280							25000							
2700 2700	46 46	RUN RUN	119 115	370 350	320 305	20000 15000	2550 2400	F.T. 42	RUN RUN	99 94	355 335	310 290	2300 2150	F.T. F.T.	RUN RUN	74 70	325 310	280 270	2050 1900	F.T. F.T.	RUN RUN	55 54	275 270	240 235	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	330 310 295	285 270 255	10000 5000 S.L.	2350 2350 2350	42 41 41	RUN RUN RUN	87 82 78	315 295 280	275 255 245	2100 2100 2100	39 39 39	RUN RUN RUN	65 63 60	290 275 260	250 240 225	1750 1750 1750	35 35 36	RUN RUN RUN	50 48 45	255 240 230	220 210 200	10000 5000 S.L.	1600 1600 1600	33 33 33	RUN RUN RUN	45 43 41	235 225 215	205 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 19 GAL.) TO FLY 1100 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2050 RPM AND F. T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 66 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 500-pound Bombs

AFHC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,400 TO 9400 POUNDS

EXTERNAL LOAD ITEMS
2 - 500-LB. WING BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RICH	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RICH	15 MIN.		167 158

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
540 470 410	*470* *410* *360*	184 160 140	700 610 530	*610* *530* *460*	830 720 630	*720* *620* *540*	950 820 720	*820* *710* *630*	184 160 140	1000 870 760	*860* *750* *660*
350 290 230	*300* *250* *200*	120 100 80	460 380 300	*400* *330* *260*	540 450 360	*470* *390* *310*	620 510 410	*540* *450* *360*	120 100 80	650 540 430	*560* *470* *380*
180 120 60	*150* *100* *50*	60 40 20	230 150 80	*200* *130* *70*	270 180 90	*230* *160* *80*	310 210 100	*270* *180* *90*	60 40 20	320 220 110	*280* *190* *90*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.8 STAT. (3.3 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.5 STAT. (3.9 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.15 STAT. (4.45 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	365	315	25000	2600	45	RUN	92	360	310	2200	39	RUN	75	335	290							25000							
2700 2700	46 46	RUN RUN	119 115	370 350	320 305	20000 15000	2500 2300	F.T. 41	RUN RUN	93 84	350 325	305 280	2300 2100	F.T. F.T.	RUN RUN	73 68	330 305	285 265	2100 1900	F.T. F.T.	RUN RUN	57 54	290 275	250 .240	20000 15000								
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	330 310 295	285 270 255	10000 5000 S.L.	2300 2300 2300	41 41 41	RUN RUN RUN	82 77 73	310 290 275	270 250 240	2100 2050 2050	39 39 39	RUN RUN RUN	64 60 57	290 270 255	250 235 220	1750 1750 1750	36 36 36	RUN RUN RUN	51 48 45	260 245 230	225 210 200	10000 5000 S.L.	1600 1600 1600	31 31 30	RUN RUN RUN	42 41 39	230 220 210	200 190 180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 140 GAL. OF FUEL
(AFTER DEDUCTING TOTAL ALLOWANCES OF [illegible] GAL.)
TO FLY 700 STAT. AIRMILES AT 20,000 FT. ALTITUDE
MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE
WITH MIXTURE SET: [illegible]

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 66 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 500-pound Bombs

AAFHC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,000 TO 11,400 POUNDS

EXTERNAL LOAD ITEMS
2 1000-POUND BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT.III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 158	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

For use with V-1650-3 engine only regardless of airplane model.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																															
770		670				269	960		830				1170		1010				1290		1120				269	1360		1180			
690		600				240	860		750				1040		900				1160		1010				240	1210		1050			
630 570		550 490				220 200	790 720		680 620				950 860		820 750				1060 970		920 840				220 200	1120 1020		970 880			
520 460		450 380				180 160	650 580		560 500				770 680		670 590				870 780		750 680				180 160	920 820		800 710			
MAXIMUM CONTINUOUS						PRESS ALT. FEET	(3.5 STAT. (3.05 NAUT.) MI./GAL.)						(4.1 STAT. (3.55 NAUT.) MI./GAL.)						(4.7 STAT. (4.1 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
2700	46	RUN	96	350	305	25000							2400	41	RUN	61	330	285							25000						
2700 2700	46 46	RUN RUN	119 115	365 345	315 300	20000 15000	2550 2400	F.T. 42	RUN RUN	100 95	350 330	305 285	2350 2200	F.T. 40	RUN RUN	79 76	325 310	280 270	2150 2000	F.T. F.T.	RUN RUN	61 60	285 280	245 245	20000 15000						
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	325 310 290	280 270 250	10000 5000 S.L.	2400 2400 2350	42 42 42	RUN RUN RUN	89 85 78	310 295 275	270 255 240	2200 2150 2150	40 40 40	RUN RUN RUN	73 66 63	295 275 260	255 240 225	1950 1950 1950	38 38 37	RUN RUN RUN	58 55 52	270 255 240	235 220 210	10000 5000 S.L.	1750 1750 1750	35 35 36	RUN RUN RUN	50 48 47	245 235 225	215 205 195

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 12,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 1050 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 67 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 1000-pound Bombs

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,400 TO 10,400 POUNDS

EXTERNAL LOAD ITEMS
2 - 1000-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGHH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1]. MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[II] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
530	440	184	660	570	780	680	900	780	184	940	810
460 400	380 340	160 140	580 500	500 440	680 590	590 520	780 690	680 590	160 140	820 710	710 620
340 290 230	290 240 190	120 100 80	430 360 290	370 310 250	510 420 340	440 370 300	590 490 390	510 420 340	120 100 80	610 510 410	530 440 350
170 110 60	140 100 50	60 40 20	220 140 70	190 120 60	250 170 80	220 150 70	290 200 100	250 170 80	60 40 20	310 200 100	260 180 90

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH	T.A.S. KTS.	PRESS ALT. FEET	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH	T.A.S. KTS.	(4.25 STAT. (3.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH	T.A.S. KTS.	(4.9 STAT. (4.25 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	355	310	25000							2250	40	RUN	78	330	285							25000							
2700 2700	46 46	RUN RUN	119 115	365 345	315 300	20000 15000	2500 2350	F.T. 41	RUN RUN	95 90	345 325	300 280	2350 2200	F.T. F.T.	RUN RUN	77 74	325 310	280 270	2100 1950	F.T. F.T.	RUN RUN	58 56	280 270	245 235	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	325 305 290	280 265 250	10000 5000 S.L.	2350 2350 2350	41 41 41	RUN RUN RUN	84 81 77	305 290 275	265 250 240	2150 2150 2150	40 40 40	RUN RUN RUN	70 67 62	290 275 260	250 240 225	1850 1850 1850	36 36 37	RUN RUN RUN	54 51 49	260 245 235	225 210 205	10000 5000 S.L.	1600 1600 1600	F.T. 34 34	RUN RUN RUN	48 44 42	235 225 215	205 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 140 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 44 GAL.) TO FLY 650 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 67 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 1000-pound Bombs

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 10,000 POUNDS

EXTERNAL LOAD ITEMS
2 - 75-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[2] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
					SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						
1220 1170	*1060* *1010*	419 400	1530 1460	*1330* *1270*	1870 1790	*1620* *1540*	2190 2090	*1900* *1820*	419 400	2270 2170	*1970* *1880*
1110 1050 990	*960* *910* *860*	380 360 340	1390 1320 1250	*1200* *1140* *1080*	1700 1610 1520	*1470* *1390* *1320*	1990 1890 1790	*1730* *1640* *1550*	380 360 340	2060 1960 1850	*1790* *1700* *1610*
930 880 820	*710* *760* *710*	320 300 280	1180 1100 1030	*1020* *950* *890*	1430 1350 1260	*1240* *1160* *1090*	1690 1580 1480	*1460* *1380* *1290*	320 300 280	1750 1640 1540	*1510* *1420* *1330*
760	*660*	260	960	*830*	1170	*1010*	1380	*1200*	260	1430	*1240*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	8.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.4 STAT. (3.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.1 STAT. (4.4 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
2700	46	RUN	100	385	335								2400	F.T.	RUN	81	355	310													
2700	46	RUN	96	360	310	25000							2200	39	RUN	76	335	290							25000						
2700 2700	46 46	RUN RUN	119 115	370 350	320 305	20000 15000	2550 2400	F.T. 42	RUN RUN	99 94	355 335	310 290	2300 2150	F.T. F.T.	RUN RUN	74 70	325 310	280 270	2050 1900	F.T. F.T.	RUN RUN	55 54	275 270	240 235	20000 15000						
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	330 310 295	285 270 255	10000 5000 S.L.	2350 2350 2350	42 41 41	RUN RUN RUN	87 82 78	315 295 280	275 255 245	2100 2100 2100	39 39 39	RUN RUN RUN	65 63 60	290 275 260	250 240 225	1750 1750 1750	35 35 36	RUN RUN RUN	50 48 45	255 240 230	220 210 200	10000 5000 S.L.	1600 1600 1600	33 33 33	RUN RUN RUN	41 43 45	235 225 215	205 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 300 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 50 GAL.) TO FLY 1800 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2050 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD-PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 68 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 75-gallon Tanks

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,000 TO 8600 POUNDS

EXTERNAL LOAD ITEMS
2 - 75-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
790 710	690 610	269 240	990 890	860 770	1210 1080	1050 940	1420 1270	1240 1100	269 240	1480 1320	1290 1150
650 590 530	560 510 460	220 200 180	810 740 670	710 640 580	990 900 810	860 780 700	1160 1060 950	1010 920 830	220 200 180	1210 1100 990	1050 960 860
470 410 350 290	410 360 310 250	160 140 120 100	590 520 440 370	510 450 380 320	720 630 540 450	620 550 470 390	850 740 640 530	740 640 550 460	160 140 120 100	880 770 660 550	770 670 570 480
240 180 120	200 150 100	80 60 40	300 220 150	260 190 130	360 270 180	310 230 160	420 320 210	370 280 180	80 60 40	440 330 220	380 290 190

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.7 STAT. (3.2 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.5 STAT. (3.9 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.3 STAT. (4.6 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000							
2700	F.T.	RUN	90	380	330	35000																			35000							
2700	46	RUN	100	385	335	30000							2350	F.T.	RUN	80	360	310							30000							
2700	46	RUN	96	360	310	25000							2200	40	RUN	75	335	290	2150	F.T.	RUN	53	280	245	25000							
2700	46	RUN	119	370	320	20000	2500	F.T.	RUN	97	355	310	2300	F.T.	RUN	72	325	280	1950	F.T.	RUN	52	270	235	20000							
2700	46	RUN	115	350	305	15000	2350	41	RUN	90	330	285	2100	F.T.	RUN	68	305	265	1850	F.T.	RUN	51	265	230	15000							
2700	46	RUN	110	330	285	10000	2350	41	RUN	84	310	270	2100	39	RUN	65	290	250	1700	35	RUN	49	255	220	10000	1600	30	RUN	42	230	200
2700	46	RUN	106	310	270	5000	2350	41	RUN	82	295	255	2050	39	RUN	60	270	235	1650	35	RUN	47	240	210	5000	1600	30	RUN	40	220	190
2700	46	RUN	101	295	255	S.L.	2350	41	RUN	77	280	245	2050	39	RUN	56	255	220	1650	35	RUN	43	225	195	S.L.	1600	31	RUN	38	210	180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 10 GAL.) TO FLY 1150 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 1950 RPM AND 7. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

Figure 68 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 75-gallon Tanks

AAFMC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,600 TO 10,200 POUNDS

EXTERNAL LOAD ITEMS
2 - 110-GALLON COMBAT TANKS

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		187 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																															
1410		1220				489	1740		1510				2100		1820				2450		2120				489	2540		2210			
1330		1150				460	1640		1420				1980		1720				2310		2000				460	2400		2090			
1270		1100				440	1570		1360				1900		1640				2210		1920				440	2300		2000			
1210		1050				420	1500		1300				1810		1570				2120		1840				420	2200		1910			
1150		1000				400	1430		1240				1730		1500				2020		1750				400	2100		1830			
1100		950				380	1360		1180				1640		1430				1930		1670				380	2000		1740			
1040		900				360	1290		1110				1560		1350				1830		1590				360	1900		1650			
980		850				340	1220		1050				1480		1280				1730		1500				340	1800		1570			
920		800				320	1150		990				1390		1210				1640		1420				320	1700		1480			
870		750				300	1080		930				1310		1140				1540		1340				300	1600		1390			
810		700				280	1010		870				1220		1060				1450		1250				280	1500		1290			
750		650				260	940		810				1140		990				1350		1170				260	1400		1220			
MAXIMUM CONTINUOUS						PRESS	(3.5 STAT. (3.05 NAUT.) MI./GAL.)						(4.2 STAT. (3.65 NAUT.) MI./GAL.)						(4.8 STAT. (4.16 NAUT.) MI./GAL.)						PRESS	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
2700	46	RUN	100	375	325								2400	F.T.	RUN	83	345	300													
2700	46	RUN	96	355	310	25000							2350	41	RUN	81	335	290							25000						
2700	46	RUN	119	365	315	20000	2550	F.T.	RUN	98	350	305	2350	F.T.	RUN	77	325	280	2150	F.T.	RUN	62	290	250	20000						
2700	46	RUN	115	345	300	15000	2400	42	RUN	94	330	285	2200	F.T.	RUN	75	310	270	2000	F.T.	RUN	59	280	245	15000						
2700	46	RUN	110	325	280	10000	2400	42	RUN	93	315	275	2200	40	RUN	71	295	255	1900	37	RUN	56	265	230	10000	1700	35	RUN	50	245	210
2700	46	RUN	106	310	270	5000	2400	42	RUN	84	295	255	2100	40	RUN	65	275	240	1900	37	RUN	53	250	215	5000	1700	35	RUN	48	235	205
2700	46	RUN	101	295	255	S.L.	2400	42	RUN	80	280	245	2100	40	RUN	62	260	225	1950	37	RUN	52	240	210	S.L.	1750	36	RUN	45	225	195

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 440 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 48 GAL.) TO FLY 2100 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND E.T.IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 69 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—Two 110-gallon Tanks

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,200 TO 9000 POUNDS

EXTERNAL LOAD ITEMS
2 - 110-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG	3000	67	LOW HIGH	RUN	5 MIN.		187 158
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
					SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						
770 690	*670* *600*	269 240	970 860	*840* *750*	1180 1050	*1030* *920*	1400 1260	*1210* *1080*	269 240	1450 1300	*1260* *1120*
630 570 510	*550* *500* *450*	220 200 180	790 720 650	*690* *620* *560*	970 880 790	*840* *760* *690*	1140 1040 940	*990* *900* *810*	220 200 180	1190 1080 970	*1030* *940* *840*
460 400 340	*400* *350* *300*	160 140 120	580 500 430	*500* *440* *370*	700 620 530	*610* *530* *460*	830 730 620	*720* *630* *540*	160 140 120	860 760 650	*750* *660* *560*
290 230 170 110	*250* *200* *150* *100*	100 80 60 40	360 290 220 140	*310* *250* *190* *120*	440 350 260 180	*380* *310* *230* *150*	520 420 310 210	*450* *360* *270* *180*	100 80 60 40	540 430 320 220	*470* *370* *280* *190*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.4 STAT. (3.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(5.2 STAT. (4.5 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000							
2700	F.T.	RUN	90	375	325	35000																			35000							
2700	46	RUN	100	380	330	30000							2350	F.T.	RUN	79	360	305							30000							
2700	46	RUN	96	360	310	25000							2250	40	RUN	77	335	290	2150	F.T.	RUN	54	275	240	25000							
2700	46	RUN	119	365	315	20000	2550	F.T.	RUN	98	350	305	2300	F.T.	RUN	75	325	280	1950	F.T.	RUN	52	285	230	20000							
2700	46	RUN	115	345	300	15000	2400	42	RUN	94	330	285	2150	F.T.	RUN	70	305	265	1850	F.T.	RUN	51	260	225	15000							
2700	46	RUN	110	330	285	10000	2350	41	RUN	85	310	270	2100	39	RUN	67	290	250	1650	35	RUN	49	250	215	10000	1600	30	RUN	43	225	195
2700	46	RUN	106	310	270	5000	2350	41	RUN	80	290	250	2100	39	RUN	61	270	235	1650	34	RUN	46	235	205	5000	1600	30	RUN	40	215	185
2700	46	RUN	101	290	250	S.L.	2350	41	RUN	75	275	240	2100	39	RUN	58	255	220	1650	34	RUN	43	220	190	S.L.	1600	31	RUN	38	205	180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,000 LB. GROSS WEIGHT WITH 280 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 30 GAL.) TO FLY 1100 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 69 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—Two 110-gallon Tanks

AAFHC-528
N-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,600 TO 9000 POUNDS

EXTERNAL LOAD ITEMS
10 ROCKETS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. 111)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
740	650	269	890	770	1080	930	1230	1080	269	1300	1130
660	580	240	790	680	960	830	1100	960	240	1160	1010
610	530	220	720	630	880	760	1010	880	220	1060	920
550	480	200	660	570	800	690	920	800	200	970	840
500	430	180	590	510	720	620	830	720	180	870	760
440	380	160	530	460	640	550	740	640	160	770	670
390	340	140	460	400	560	490	640	560	140	680	590
330	290	120	400	340	480	420	550	480	120	580	500
280	240	100	330	290	400	350	460	400	100	480	420
220	190	80	260	230	320	280	370	320	80	390	340
170	140	60	200	170	240	210	280	240	60	290	250
110	100	40	130	110	160	140	180	160	40	190	170

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.3 STAT. (2.85 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	(4.0 STAT. (3.45 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	(4.6 STAT. (4.00 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	T.A.S. MPH.	T.A.S. KTS.
						40000																			40000							
2700	F.T.	RUN	90	345	300	35000																			35000							
2700	46	RUN	100	360	310	30000							2400	F.T.	RUN	84	335	290							30000							
2700	46	RUN	96	340	295	25000							2300	41	RUN	81	320	280	2300	F.T.	RUN	63	285	250	25000							
2700	46	RUN	119	350	305	20000	2550	F.T.	RUN	104	340	295	2350	F.T.	RUN	79	315	275	2150	F.T.	RUN	61	275	240	20000							
2700	46	RUN	115	335	290	15000	2450	42	RUN	97	320	280	2150	F.T.	RUN	74	295	255	2000	F.T.	RUN	59	265	230	15000							
2700	46	RUN	110	315	275	10000	2400	42	RUN	90	300	260	2150	40	RUN	71	280	245	1900	37	RUN	56	255	220	10000	1650	F.T.	RUN	48	230	200
2700	46	RUN	106	300	260	5000	2400	42	RUN	86	285	245	2150	40	RUN	67	265	230	1900	37	RUN	53	240	210	5000	1700	35	RUN	48	225	195
2700	46	RUN	101	280	245	S.L.	2400	42	RUN	82	270	235	2150	40	RUN	62	250	215	1900	37	RUN	51	230	200	S.L.	1750	35	RUN	46	215	185

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 1000 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

Figure 70—Flight Operation Instruction Chart—10 Rockets

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

AAFMC-528
R-1-43

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,600 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 500-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
720	620	269	850	730	1010	880	1170	1050	269	1230	1060
640	560	240	760	650	910	790	1040	910	240	1100	950
590 540	510 460	220 200	700 630	600 550	830 760	720 660	960 870	830 760	220 200	1010 920	870 800
480 430	420 370	180 160	570 510	490 440	680 610	590 530	790 700	680 610	180 160	830 740	720 640

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (2.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.7 STAT. (3.2 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.3 STAT. (3.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	330	285	25000							2450	43	RUN	85	315	275							25000							
2700 2700	46 46	RUN RUN	119 115	345 325	300 280	20000 15000	2600 2500	F.T. 43	RUN RUN	107 103	335 320	290 280	2450 2250	F.T. 40	RUN RUN	85 81	315 300	275 260	2150 2050	F.T. F.T.	RUN RUN	63 63	270 270	235 235	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	305 290 275	265 250 240	10000 5000 S.L.	2500 2500 2500	43 43 43	RUN RUN RUN	98 94 90	300 285 270	260 245 235	2250 2250 2250	40 41 41	RUN RUN RUN	76 74 70	280 270 255	245 235 220	2000 2000 2000	38 38 38	RUN RUN RUN	59 58 54	255 245 230	220 210 200	10000 5000 S.L.	1800 1850 1900	36 36 37	RUN RUN RUN	53 52 50	235 230 220	205 200 190

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 48 GAL.) TO FLY 950 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

Figure 71 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 500-pound Bombs

AAFMC-528
8-1-48

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 10,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 500-LB. BOMBS

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
490	430	184	590	510	700	610	810	700	184	850	740
430 370	370 320	160 140	510 450	440 390	610 530	530 460	700 620	610 530	160 140	740 650	640 560
320 270 210	280 230 190	120 100 80	380 320 250	330 280 220	460 380 300	400 330 260	530 440 350	460 380 310	120 100 80	560 460 370	480 400 320
160 110 50	140 90 50	60 40 20	190 130 60	170 110 60	230 150 80	200 130 70	260 180 90	230 150 80	60 40 20	280 190 90	240 160 80

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.2 STAT. (2.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(3.8 STAT. (3.3 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(4.4 STAT. (3.8 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	335	290	25000							2450	42	RUN	84	315	275							25000							
2700 2700	46 46	RUN RUN	119 115	345 325	300 280	20000 15000	2600 2450	F.T. 43	RUN RUN	105 99	335 315	290 275	2400 2250	F.T. 40	RUN RUN	83 80	315 300	275 260	2150 2000	F.T. F.T.	RUN RUN	61 60	270 265	235 230	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	310 290 275	270 250 240	10000 5000 S.L.	2400 2400 2400	42 42 42	RUN RUN RUN	91 87 83	295 280 265	255 245 230	2200 2200 2200	40 40 40	RUN RUN RUN	74 70 65	280 265 250	245 230 215	1950 1950 2000	37 37 38	RUN RUN RUN	58 55 53	255 240 230	220 210 200	10000 5000 S.L.	1750 1800 1800	35 36 36	RUN RUN RUN	51 50 48	230 225 215	200 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 190 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 44 GAL.) TO FLY 600 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE	F.R. : FULL RICH
M.P. : MANIFOLD PRESSURE	A.R. : AUTO-RICH
GPH : U.S. GAL. PER HOUR	A.L. : AUTO-LEAN
TAS : TRUE AIRSPEED	C.L. : CRUISING LEAN
KTS. : KNOTS	M.L. : MANUAL LEAN
S.L. : SEA LEVEL	F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-7 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 71 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 500-pound Bombs

AAFHC-528
8-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,600 TO 12,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS PLUS 2 - 1000-LB. BOMBS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 166	FOR DETAILS SEE POWER PLANT CHART (FIG.) SECT. III
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																															
710		620				269	830		710				960		830				1090		940				269	1130		980			
630		550				240	740		640				860		740				980		840				240	1010		880			
580 530		510 460				220 200	680 620		590 530				790 720		680 620				900 820		780 710				220 200	930 850		810 730			
470 420		420 370				180 160	560 500		480 430				650 580		560 500				740 660		640 570				180 160	760 680		660 590			
MAXIMUM CONTINUOUS						PRESS ALT. FEET	(3.0 STAT. (2.6 NAUT.) MI./GAL.)						(3.5 STAT. (3.05 NAUT.) MI./GAL.)						(3.95 STAT. (3.45 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000						
2700	46	RUN	96	310	270	25000																			25000						
2700 2700	48 46	RUN RUN	119 115	330 315	285 275	20000 15000	2600 2450	F.T. 43	RUN RUN	105 100	320 305	280 265	2450 2250	F.T. 41	RUN RUN	86 81	300 285	260 245	2100	F.T.	RUN	67	260	225	20000 15000						
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	300 285 270	260 245 235	10000 5000 S.L.	2500 2500 2500	43 43 43	RUN RUN RUN	98 94 88	290 275 260	250 240 225	2300 2300 2250	41 41 41	RUN RUN RUN	80 76 70	275 260 245	240 225 215	2100 2100 2100	39 39 39	RUN RUN RUN	63 62 59	250 240 230	215 210 200	10000 5000 S.L.	1950 1950 1950	38 38 38	RUN RUN RUN	58 56 53	235 225 215	205 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 12,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 900 STAT. AIRMILES AT 15,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: [redacted]

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 72 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 1000-pound Bombs

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,000 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 1000-LB. BOMBS

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	FOR DETAILS SEE POWER PLANT CHART (FIG. 111) SECT.
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]											
490	420	184	570	490	660	570	750	650	184	780	680
420 370	370 320	160 140	500 430	430 380	580 500	500 440	660 570	570 500	160 140	680 590	590 520
320 260 210	280 230 180	120 100 80	370 310 250	320 270 220	430 360 290	370 310 250	490 410 330	430 360 280	120 100 80	510 420 340	440 370 290
160 110 50	140 90 50	60 40 20	190 120 60	160 110 50	220 140 70	190 120 60	250 160 80	210 140 70	60 40 20	250 170 80	220 150 70

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (2.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.1 STAT. (3.55 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	315	275	25000							2350	41	RUN	82	290	250							25000							
2700 2700	46 46	RUN RUN	119 115	335 315	290 275	20000 15000	2550 2450	F.T. 43	RUN RUN	103 99	320 305	280 265	2400 2250	F.T. 40	RUN RUN	84 79	300 285	260 245	2050	F.T.	RUN	63	255	220	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	300 285 270	260 245 235	10000 5000 S.L.	2450 2450 2450	43 43 43	RUN RUN RUN	95 91 84	290 275 260	250 240 225	2250 2250 2250	40 40 40	RUN RUN RUN	77 73 68	275 260 245	240 225 215	2050 2050 2050	38 38 38	RUN RUN RUN	61 59 55	250 240 225	215 210 195	10000 5000 S.L.	1900 1900 1900	37 37 37	RUN RUN RUN	55 54 51	230 225 215	200 195 185

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 140 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 44 GAL.) TO FLY 550 STAT. AIRMILES AT 15,000 FT. ALTITUDE MAINTAIN 2050 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

Figure 72 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 1000-pound Bombs

AAFMC-528
11-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,600 TO 10,600 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 75-GALLON COMBAT TANKS

LIMITS	RPM.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
1140	990	419	1320	1150	1600	1390	1850	1600	419	1940	1690
1090 1030	950 900	400 380	1260 1200	1100 1040	1530 1450	1330 1260	1770 1690	1530 1460	400 380	1860 1770	1620 1540
980 920 870	850 810 760	360 340 320	1140 1080 1020	990 930 880	1380 1310 1230	1200 1140 1070	1600 1510 1430	1380 1310 1230	360 340 320	1680 1590 1500	1460 1380 1300
820 760 710	710 670 620	300 280 260	950 890 830	830 770 720	1160 1080 1010	1010 940 880	1340 1260 1170	1160 1080 1010	300 280 260	1410 1320 1230	1230 1150 1070

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (2.70 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(3.7 STAT. (3.2 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	(4.3 STAT. 3.75 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	T.A.S. MPH.	T.A.S. KTS.
2700	46	RUN	100	345	300	40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	330	285	25000							2450	43	RUN	85	315	275							25000							
2700 2700	46 46	RUN RUN	119 115	345 325	300 280	20000 15000	2600 2500	F.T. 43	RUN RUN	107 103	335 320	290 280	2450 2250	F.T. 40	RUN RUN	85 81	315 300	275 260	2150 2050	F.T. F.T.	RUN RUN	63 63	270 270	235 235	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	305 290 275	265 250 240	10000 5000 S.L.	2500 2500 2500	43 43 43	RUN RUN RUN	98 94 90	300 285 270	260 245 235	2250 2250 2250	40 41 41	RUN RUN RUN	76 74 70	280 270 255	245 235 220	2000 2000 2000	38 38 38	RUN RUN RUN	59 58 54	255 245 230	220 210 200	10000 5000 S.L.	1800 1850 1900	36 36 37	RUN RUN RUN	53 52 50	235 230 220	205 200 190

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 380 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 90 GAL.) TO FLY 1600 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 73 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 75-gallon Tanks

AAFMC-528
4-1-45

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 10,600 TO 9200 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 75-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
					SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]						
740	640	269	860	750	1040	910	1200	1040	269	1280	1100
660	570	240	770	670	940	810	1080	940	240	1140	990
600	520	220	700	610	860	740	990	860	220	1040	910
550	480	200	640	560	780	680	900	780	200	950	820
490	430	180	580	500	700	610	810	700	180	850	740
440	380	160	510	440	620	540	770	620	160	760	660
380	330	140	450	390	550	470	630	550	140	660	580
330	280	120	380	330	470	410	540	470	120	570	490
270	240	100	320	280	390	340	450	390	100	470	410
220	190	80	260	220	310	270	360	310	80	380	330
160	140	60	190	170	230	200	270	230	60	280	250
110	100	40	130	110	160	140	180	160	40	190	160

MAXIMUM CONTINUOUS

PRESS ALT. FEET	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
40000						
35000						
30000	2700	46	RUN	100	350	305
25000	2700	46	RUN	96	330	285
20000	2700	46	RUN	119	345	300
15000	2700	46	RUN	115	325	280
10000	2700	46	RUN	110	310	270
5000	2700	46	RUN	106	290	250
S.L.	2700	46	RUN	101	275	240

(3.2 STAT. (2.75 NAUT.) MI./GAL.)

PRESS ALT. FEET	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
40000						
35000						
30000						
25000						
20000	2600	F.T.	RUN	105	335	290
15000	2450	43	RUN	98	315	275
10000	2450	43	RUN	95	300	260
5000	2400	42	RUN	88	280	245
S.L.	2400	42	RUN	83	265	230

(3.9 STAT. (3.4 NAUT.) MI./GAL.)

PRESS ALT. FEET	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
40000						
35000						
30000	2400	F.T.	RUN	84	330	285
25000	2350	41	RUN	81	315	275
20000	2350	F.T.	RUN	79	310	270
15000	2200	40	RUN	76	295	255
10000	2200	40	RUN	73	280	245
5000	2200	40	RUN	69	265	230
S.L.	2200	40	RUN	64	250	215

(4.5 STAT. (3.9 NAUT.) MI./GAL.)

PRESS ALT. FEET	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH	APPROX. T.A.S. KTS.
40000						
35000						
30000						
25000	2300	F.T.	RUN	63	280	245
20000	2150	F.T.	RUN	61	275	240
15000	2000	F.T.	RUN	61	270	235
10000	1950	37	RUN	58	255	220
5000	1950	37	RUN	54	240	210
S.L.	1950	38	RUN	53	230	200

MAXIMUM AIR RANGE

PRESS ALT. FEET	R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
40000						
35000						
30000						
25000						
20000						
15000	1850	F.T.	RUN	52	240	210
10000	1700	35	RUN	49	230	200
5000	1700	35	RUN	47	220	190
S.L.	1700	35	RUN	44	210	180

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 10,500 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 1000 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2000 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 73 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 75-gallon Tanks

AAFHC-828 5-5-45

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 12,200 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 110-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RICH	5 MIN.		187 168	FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)
MILITARY POWER	3000	61	LOW HIGH	RICH	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[2] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[3]											
1300 1220	*1130* *1060*	489 460	1520 1430	*1320* *1240*	1760 1660	*1520* *1430*	2010 1890	*1740* *1640*	489 460	2100 1980	*1820* *1720*
1170 1110 1010	*1010* *970* *880*	440 420 380	1370 1310 1180	*1180* *1130* *1020*	1590 1520 1440	*1370* *1310* *1250*	1810 1730 1640	*1570* *1500* *1430*	440 420 400	1890 1810 1780	*1640* *1570* *1490*
950 900 850	*830* *780* *740*	360 340 320	1120 1060 1000	*970* *920* *860*	1370 1300 1230	*1180* *1120* *1060*	1560 1480 1400	*1360* *1290* *1210*	380 360 340	1640 1550 1460	*1420* *1340* *1270*
800 740 690	*690* *650* *600*	300 280 260	930 870 810	*810* *750* *700*	1160 1080 1010 940	*1000* *930* *870* *810*	1320 1230 1150 1070	*1140* *1070* *1000* *930*	320 300 280 260	1380 1290 1210 1120	*1190* *1120* *1040* *970*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.1 STAT. (2.7 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(3.6 STAT. (3.1 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.1 STAT. (3.55 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
2700	46	RICH	100	335	290	40000 35000 30000																			40000 35000 30000						
2700	46	RICH	96	320	280	25000							2400	42	RICH	93	300	260							25000						
2700 2700	46 46	RICH RICH	119 115	340 320	295 280	20000 15000	2600 2450	F.T. 43	RICH RICH	106 100	330 310	285 270	2450 2250	F.T. 41	RICH RICH	86 82	310 295	270 255	2250 2100	F.T. F.T.	RICH RICH	68 64	270 265	235 230	20000 15000						
2700 2700 2700	46 46 46	RICH RICH RICH	110 106 101	305 290 275	265 250 240	10000 5000 S.L.	2400 2450 2450	43 43 43	RICH RICH RICH	96 92 86	295 280 265	255 245 230	2300 2250 2250	41 41 41	RICH RICH RICH	79 74 70	280 265 250	245 230 215	2050 2050 2050	39 39 39	RICH RICH RICH	62 60 56	255 245 230	220 215 200	10000 5000 S.L.	1900 1950 1950	37 37 37	RICH RICH RICH	56 54 52	235 230 220	205 200 190

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 12,000 LB. GROSS WEIGHT WITH [illegible] GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF [illegible] GAL.) TO FLY [illegible] STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2250 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: [illegible]

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 74 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 110-gallon Tanks

AAFMC-528 4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 9500 POUNDS

EXTERNAL LOAD ITEMS
6 ROCKETS AND 2 - 110-GALLON COMBAT TANKS

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.	
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168	FOR DETAILS SEE POWER PLANT CHART (FIG. 111)
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153	

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

For use with V-1650-3 engine only regardless of airplane model.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V					
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES					
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL			
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																															
710 640		620 550				269 240	860 770		750 670				1020 910		890 790				1180 1050		1030 920				269 240	1220 1080		1060 950			
580 530 480		510 460 410				220 200 180	700 640 580		610 560 500				840 760 680		690 660 590				970 880 790		840 760 690				220 200 180	1000 910 820		870 790 710			
420 370 320		370 320 280				160 140 120	510 450 380		440 390 330				610 530 460		530 460 400				700 620 530		610 530 460				160 140 120	730 640 550		630 550 470			
260 210 160 110		230 180 140 90				100 80 60 40	320 260 190 130		280 220 170 110				380 300 230 150		330 260 200 130				440 350 260 180		380 310 230 150				100 80 60 40	450 360 270 180		390 320 240 160			
MAXIMUM CONTINUOUS						PRESS ALT. FEET	(3.2 STAT. (2.8 NAUT.) MI./GAL.)						(3.8 STAT. (3.3 NAUT.) MI./GAL.)						(4.4 STAT. (3.8 NAUT.) MI./GAL.)						PRESS ALT. FEET	MAXIMUM AIR RANGE					
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.		R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
2700	46	RUN	100	345	300	40000 35000 30000							2400	F.T.	RUN	84	320	280							40000 35000 30000						
2700	46	RUN	96	330	285	25000							2400	42	RUN	83	310	270							25000						
2700 2700	46 46	RUN RUN	119 115	340 320	295 280	20000 15000	2550 2450	F.T. 42	RUN RUN	104 97	330 310	285 270	2400 2200	F.T. 40	RUN RUN	80 76	305 290	265 250	2150 2000	F.T. F.T.	RUN RUN	61 58	265 255	230 220	20000 15000						
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	305 290 275	265 250 240	10000 5000 S.L.	2450 2400 2400	42 42 42	RUN RUN RUN	94 85 80	295 275 260	255 240 225	2200 2200 2200	40 40 40	RUN RUN RUN	73 69 64	275 260 245	240 225 215	1900 1950 1950	37 37 37	RUN RUN RUN	56 54 52	245 235 225	215 205 195	10000 5000 S.L.	1800 1800 1850	36 36 36	RUN RUN RUN	52 50 48	230 225 215	200 195 185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.) PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 40 GAL.) TO FLY 950 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2150 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 74 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—6 Rockets and Two 110-gallon Tanks

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,900 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
1 - 110-GALLON COMBAT TANK
AND 1 - 1000-LB. BOMB

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
1080	*940*	379	1320	*1140*	1580	*1370*	1830	*1590*	379	1930	*1670*
1030 970	*890* *840*	360 340	1250 1190	*1080* *1030*	1500 1420	*1300* *1230*	1740 1650	*1510* *1430*	360 340	1840 1740	*1590* *1510*
910 850	*790* *740*	320 300	1120 1050	*970* *910*	1350 1250	*1170* *1080*	1550 1460	*1340* *1270*	320 300	1640 1540	*1420* *1330*
800 740	*690* *640*	280 260	980 910	*850* *790*	1170 1090	*1010* *950*	1360 1270	*1180* *1100*	280 260	1440 1340	*1250* *1160*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.45 STAT. (3.0 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.1 STAT. (3.55 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.75 STAT. (4.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	350	305	25000							2400	42	RUN	83	335	290							25000							
2700 2700	46 46	RUN RUN	119 115	365 345	315 300	20000 15000	2550 2450	F.T. 43	RUN RUN	101 99	350 335	305 290	2400 2200	F.T. F.T.	RUN RUN	81 75	330 310	285 270	2100 2000	F.T. F.T.	RUN RUN	60 59	280 275	245 240	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	325 310 290	280 270 250	10000 5000 S.L.	2450 2400 2400	42 42 42	RUN RUN RUN	95 86 82	315 295 280	275 255 245	2200 2200 2200	40 40 40	RUN RUN RUN	73 69 65	295 285 265	255 245 230	1900 1950 1950	37 37 37	RUN RUN RUN	57 55 52	265 255 240	230 220 210	10000 5000 S.L.	1700 1750 1750	35 35 36	RUN RUN RUN	50 48 45	240 235 225	210 205 195

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 320 GAL. OF FUEL
(AFTER DEDUCTING TOTAL ALLOWANCES OF 59 GAL.)
TO FLY 1500 STAT. AIRMILES AT 20,000 FT. ALTITUDE
MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE
WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 75 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—One 110-gallon Tank and One 1000-pound Bomb

AAFMC-528
4-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K

ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,900 TO 11,000 POUNDS

EXTERNAL LOAD ITEMS
1 - 110-GALLON COMBAT TANK
AND 1 - 1000-LB. BOMB

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I RANGE IN AIRMILES STATUTE	COLUMN I RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN II RANGE IN AIRMILES STATUTE	COLUMN II RANGE IN AIRMILES NAUTICAL	COLUMN III RANGE IN AIRMILES STATUTE	COLUMN III RANGE IN AIRMILES NAUTICAL	COLUMN IV RANGE IN AIRMILES STATUTE	COLUMN IV RANGE IN AIRMILES NAUTICAL	FUEL U.S. GAL.	COLUMN V RANGE IN AIRMILES STATUTE	COLUMN V RANGE IN AIRMILES NAUTICAL
			SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]								
1080	*940*	379	1320	*1140*	1580	*1370*	1830	*1590*	379	1930	*1670*
1030 970	*890* *840*	360 340	1250 1190	*1080* *1030*	1500 1420	*1300* *1230*	1740 1650	*1510* *1430*	360 340	1840 1740	*1590* *1510*
910 850	*790* *740*	320 300	1120 1050	*970* *910*	1350 1250	*1170* *1080*	1550 1460	*1340* *1270*	320 300	1640 1540	*1420* *1330*
800 740	*690* *640*	280 260	980 910	*850* *790*	1170 1090	*1010* *950*	1360 1270	*1180* *1100*	280 260	1440 1340	*1250* *1160*

MAXIMUM CONTINUOUS R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	(3.45 STAT. (3.0 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.1 STAT. (3.55 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	(4.75 STAT. (4.10 NAUT.) MI./GAL.) R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	PRESS ALT. FEET	MAXIMUM AIR RANGE R.P.M.	M.P. INCHES	MIXTURE	APPROX. TOT. G.P.H.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000 35000 30000																			40000 35000 30000							
2700	46	RUN	96	350	305	25000							2400	42	RUN	83	335	290							25000							
2700 2700	46 46	RUN RUN	119 115	365 345	315 300	20000 15000	2550 2450	F.T. 43	RUN RUN	101 99	350 335	305 290	2400 2200	F.T. F.T.	RUN RUN	81 75	330 310	285 270	2100 2000	F.T. F.T.	RUN RUN	60 59	280 275	245 240	20000 15000							
2700 2700 2700	46 46 46	RUN RUN RUN	110 106 101	325 310 290	280 270 250	10000 5000 S.L.	2450 2400 2400	42 42 42	RUN RUN RUN	95 86 82	315 295 280	275 255 245	2200 2200 2200	40 40 40	RUN RUN RUN	73 69 65	295 285 265	255 245 230	1900 1950 1950	37 37 37	RUN RUN RUN	57 55 52	265 255 240	230 220 210	10000 5000 S.L.	1700 1750 1750	35 35 36	RUN RUN RUN	50 48 45	240 235 225	210 205 195

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,500 LB. GROSS WEIGHT WITH 320 GAL. OF FUEL
(AFTER DEDUCTING TOTAL ALLOWANCES OF 59 GAL.)
TO FLY 1500 STAT. AIRMILES AT 20,000 FT. ALTITUDE
MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE
WITH MIXTURE SET: RUN

LEGEND

ALT. : PRESSURE ALTITUDE
M.P. : MANIFOLD PRESSURE
GPH : U.S. GAL. PER HOUR
TAS : TRUE AIRSPEED
KTS. : KNOTS
S.L. : SEA LEVEL
F.R. : FULL RICH
A.R. : AUTO-RICH
A.L. : AUTO-LEAN
C.L. : CRUISING LEAN
M.L. : MANUAL LEAN
F.T. : FULL THROTTLE

DATA AS OF *5-8-45* BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

For use with V-1650-3 engine only regardless of airplane model.

Figure 75 (Sheet 1 of 2 Sheets)—Flight Operation Instruction Chart—One 110-gallon Tank and One 1000-pound Bomb

AAFHC-528
8-1-44

AIRCRAFT MODEL(S)
P-51D AND P-51K
ENGINE(S): V-1650-3

FLIGHT OPERATION INSTRUCTION CHART

CHART WEIGHT LIMITS: 11,000 TO 9600 POUNDS

EXTERNAL LOAD ITEMS
1 - 110-GALLON COMBAT TANK
AND 1 - 1000-LB. BOMB

LIMITS	R.P.M.	M.P. IN.HG.	BLOWER POSITION	MIXTURE POSITION	TIME LIMIT	CYL. TEMP.	TOTAL G.P.H.
WAR EMERG.	3000	67	LOW HIGH	RUN	5 MIN.		187 168
MILITARY POWER	3000	61	LOW HIGH	RUN	15 MIN.		167 153

FOR DETAILS SEE POWER PLANT CHART (FIG. SECT. III)

INSTRUCTIONS FOR USING CHART: SELECT FIGURE IN FUEL COLUMN EQUAL TO OR LESS THAN AMOUNT OF FUEL TO BE USED FOR CRUISING[1] MOVE HORIZONTALLY TO RIGHT OR LEFT AND SELECT RANGE VALUE EQUAL TO OR GREATER THAN THE STATUTE OR NAUTICAL AIR MILES TO BE FLOWN. VERTICALLY BELOW AND OPPOSITE VALUE NEAREST DESIRED CRUISING ALTITUDE (ALT.) READ RPM, MANIFOLD PRESSURE (M.P.) AND MIXTURE SETTING REQUIRED.

NOTES: COLUMN I IS FOR EMERGENCY HIGH SPEED CRUISING ONLY. COLUMNS II, III, IV AND V GIVE PROGRESSIVE INCREASE IN RANGE AT A SACRIFICE IN SPEED. AIR MILES PER GALLON (MI./GAL.) (NO WIND), GALLONS PER HR. (G.P.H.) AND TRUE AIRSPEED (T.A.S.) ARE APPROXIMATE VALUES FOR REFERENCE. RANGE VALUES ARE FOR AN AVERAGE AIRPLANE FLYING ALONE (NO WIND).[1] TO OBTAIN BRITISH IMPERIAL GAL. (OR G.P.H.): MULTIPLY U.S. GAL. (OR G.P.H.) BY 10 THEN DIVIDE BY 12.

COLUMN I						FUEL	COLUMN II						COLUMN III						COLUMN IV						FUEL	COLUMN V				
RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES						RANGE IN AIRMILES						RANGE IN AIRMILES						U.S.	RANGE IN AIRMILES				
STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL				STATUTE		NAUTICAL				STATUTE		NAUTICAL				GAL.	STATUTE		NAUTICAL		
SUBTRACT FUEL ALLOWANCES NOT AVAILABLE FOR CRUISING[1]																														
770		670				269	940		820				1130		980				1320		1140				269	1390		1210		
690		600				240	840		730				1010		870				1170		1020				240	1240		1080		
630		550				220	770		670				920		800				1080		930				220	1140		990		
570		500				200	700		610				840		730				980		850				200	1030		900		
510		450				180	630		550				760		660				880		760				180	930		810		
460		400				160	560		490				670		580				780		680				160	830		720		
400		350				140	490		430				590		510				690		590				140	720		630		
340		300				120	420		360				500		440				590		510				120	620		540		
290		250				100	350		300				420		360				490		420				100	520		450		
230		200				80	280		240				340		290				390		340				80	410		360		
170		150				60	210		180				250		220				290		250				60	310		270		
110		100				40	140		120				170		150				200		170				40	210		180		
MAXIMUM CONTINUOUS						PRESS	(3.5 STAT. (3.0 NAUT.) MI./GAL.)						(4.2 STAT. (3.65 NAUT.) MI./GAL.)						(4.9 STAT. (4.25 NAUT.) MI./GAL.)						PRESS	MAXIMUM AIR RANGE				
R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.	ALT. FEET	R.P.M.	M.P. INCHES	MIX-TURE	APPROX. TOT. GPH.	APPROX. T.A.S. MPH.	APPROX. T.A.S. KTS.
						40000																			40000					
						35000																			35000					
						30000																			30000					
2700	46	RUN	96	355	310	25000							2300	40	RUN	80	335	290							25000					
2700	46	RUN	119	365	315	20000	2550	F.T.	RUN	100	350	305	2350	F.T.	RUN	80	330	285	2100	F.T.	RUN	59	285	245	20000					
2700	46	RUN	115	345	300	15000	2400	42	RUN	95	330	285	2200	F.T.	RUN	74	310	270	1950	F.T.	RUN	57	275	240	15000					
2700	46	RUN	110	325	280	10000	2400	42	RUN	89	310	270	2200	40	RUN	72	295	255	1900	37	RUN	55	265	230	10000	1600	33	RUN	45	230	200
2700	46	RUN	106	310	270	5000	2400	42	RUN	86	295	255	2150	40	RUN	66	275	240	1900	37	RUN	52	250	215	5000	1600	33	RUN	43	225	195
2700	46	RUN	101	290	250	S.L.	2400	42	RUN	82	280	245	2150	40	RUN	62	260	225	1850	37	RUN	49	235	205	S.L.	1600	34	RUN	42	215	185

SPECIAL NOTES

(1) MAKE ALLOWANCE FOR WARM-UP, TAKE-OFF & CLIMB (SEE FIG.)
PLUS ALLOWANCE FOR WIND, RESERVE AND COMBAT AS REQUIRED.

HIGH BLOWER ABOVE HEAVY LINE

EXAMPLE

AT 11,000 LB. GROSS WEIGHT WITH 220 GAL. OF FUEL (AFTER DEDUCTING TOTAL ALLOWANCES OF 90 GAL.) TO FLY 1000 STAT. AIRMILES AT 20,000 FT. ALTITUDE MAINTAIN 2100 RPM AND F.T. IN. MANIFOLD PRESSURE WITH MIXTURE SET: RUN

LEGEND

ALT.	: PRESSURE ALTITUDE	F.R.	: FULL RICH
M.P.	: MANIFOLD PRESSURE	A.R.	: AUTO-RICH
GPH	: U.S. GAL. PER HOUR	A.L.	: AUTO-LEAN
TAS	: TRUE AIRSPEED	C.L.	: CRUISING LEAN
KTS.	: KNOTS	M.L.	: MANUAL LEAN
S.L.	: SEA LEVEL	F.T.	: FULL THROTTLE

DATA AS OF 5-8-45 BASED ON: *FLIGHT TEST DATA*

For use with V-1650-3 engine only regardless of airplane model.

Figure 75 (Sheet 2 of 2 Sheets)—Flight Operation Instruction Chart—One 110-gallon Tank and One 1000-pound Bomb

For use with V-1650-3 engine only regardless of airplane model.